ON PITCH ACCENT PHENOMENA IN STANDARD JAPANESE

BY

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ABSTRACT

The central goal of this thesis is to provide a principled account of various pitch accent phenomena in Standard Japanese, and to demonstrate that the formalism of pitch accent assignment is identical to that of stress assignment in languages such as English. I have followed the framework of government phonology, which attempts to replace the rule component of a phonology by a set of universal principles shared by all languages, plus a group of parameters which impose a limit on the ways in which language sound system may differ from one another.

Some of the accentual processes which I have chosen to account for have already been treated in the literature. However, the analyses which these previous works offered are generally arbitrary and therefore lacking in explanatory value.

With respect to the claim that the formalism of pitch accent assignment and stress assignment is identical, I offer a non-arbitrary account of pitch accent phenomena in nouns (with and without Case-marking particles), compounds, and also in sentences, all based on one set of principles and parameters. In other words, various accentual processes which have been treated as separate events, are now explained in a unified manner.

Among the issues addressed is an explanatory account of the accent assignment of various noun-noun compounds. From the morphological and lexical accentual properties of the morphemes involved, the location of compound accent is found to be predictable.

The topics of my thesis include a new approach to the assignment of pitch in a sentence. I show how high-pitch assignment reflects the syntactic structure of the sentence in question.

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TO MY FATHER AND MY MOTHER

CHAPTER 1

Licensing in Phonology

1.0. Introduction

This study of pitch accent phenomena is couched within the theory of phonological government which is proposed by Kaye, Lowenstamm & Vergnaud (1985, 1989, 1990). In this chapter, an outline of the theory is presented. In Government Phonology, a phonological process is not treated as arbitrary, but as the manifestation of universal principles of phonology and their interaction with language-specific parameter settings. I pay particular attention to the type of government which nuclei contract at the nuclear projections, since tonal phenomena, as well as other metrical phenomena and vowel syncope, are viewed as the manifestation of this sort of phonological government.

1.1. Licensing in Phonology

In Government Phonology, a domain/word is viewed as a sequence of positions which contract licensing relations. In other words, within a domain, all the positions are involved in some form of licensing, following the Licensing Principle (Kaye 1990a).

(1) Licensing Principle
All phonological positions save one must be licensed within a domain. The unlicensed position is the head of this domain.

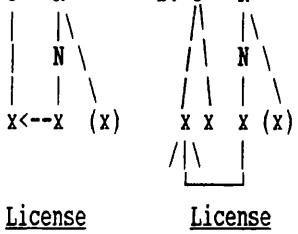
In the following sections, some detailed explanations of concrete licensing relations between positions are given. Starting from a smaller domain, that of the so-called 'syllable', I go on to explain the licensing mechanisms within the word-domain including those of compound structures.

1.1.1. Projection 0 (skeletal) level

1.1.1.1. What is a 'syllable'?

First of all, in Government Phonology, a 'syllable' does not have the status of a constituent because there is no evidence for 'syllable' as a phonological unit (KLV 1990). The constituents attested in the theory are Onset (O) and Rhyme (R), which contract licensing relations, and the head of the rhyme, Nucleus (N) (KLV 1990). In the pair (OR), the head of the rhyme, N, licenses the onset (Charette 1990).

(2) a.



b.

The onset is licensed by the adjacent nucleus to its right (2ab). Licensing requires adjacency, but not strict adjacency (2b) unlike government, which I discuss in a subsequent section. Strict adjacency means that the skeletal positions (x) which contract government/licensing relations have to be adjacent at the skeletal level, 0 projection. To show that licensing requires only adjacency, I shall consider a case such as (2b) where the onset branches. The heads of the constituents contract a licensing relation: the head of the rhyme, which is the nuclear position, licenses the head position of the onset.

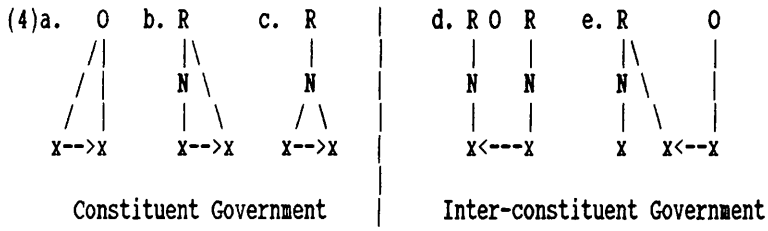
These constituent pairs are repeated, to form a larger phonological domain, e.g. a word.

(3) (O R)* (NB: * stands for repetition an arbitrary number of times)

Before expanding the domain to the word level, I first discuss licensing within the constituent in the next section. Phonological government, which I discuss in the following sections, is one form of licensing which requires the positions in question to be strictly adjacent.

1.1.1.2. Phonological government

In this section, I discuss government (licensing) relations between positions within a constituent and between constituents. The positions which contract governing relations at the skeletal level are strictly adjacent. Phonological positions are attached to constituents according to the governing relations the positions contract with each other. Adjacent skeletal positions could be in either of the following two governing relations: 1) they may be sisters within a constituent, such as onset (4a), rhyme (4b) or nucleus (4c); 2) they may belong to two different constituents (4d). The former relation is defined as constituent government which is universally head-initial (4abc), while the latter is a case of inter-constituent government, in which the potential governor, the head, is preceded by the governee which belongs to another constituent (4de). Inter-constituent government is universally head-final.



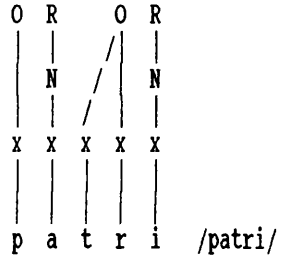
To show examples of constituent and inter-constituent government, I illustrate: 1) how word-internal consonant clusters are attached to constituents (1.1.1.3), 2) syllabification of a word-final consonant (1.1.1.4) and 3) how a vowel sequence is syllabified (1.1.1.5).

1.1.1.3. Word-internal consonant clusters

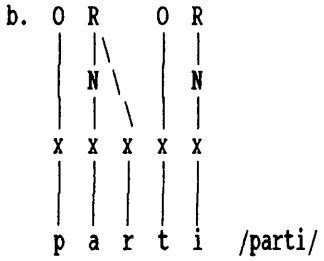
In a language where we find word-internal consonant clusters, such as French, the syllabification of the two consecutive consonants differs, depending on which segments are associated to the skeletal points. To illustrate, Charette (1991) shows examples of syllabification in two

French words --patrie 'native land' and parti '(political) party'-- by highlighting the governing relations between points. The lexical representations, of the two words are as follows:

(5)a.



b.



The consonant sequences in both words, -tr- and -rt-, are syllabified into constituents as determined by the governing relation between the two skeletal points to which the segments are attached. In patrie, the segments -tr- can only be sisters within the constituent O which branches into two skeletal points. The reason for this is that a negatively charmed segment such as /t/ can govern a neutrally charmed one such as /r/[1], but not vice-versa. These two segments should therefore be associated to points that have left to right directionality of government, that is, constituent government. On the other hand, in /parti/, the consonant sequence is -rt-, in which a neutral segment precedes a negatively charmed segment. As a result, these two words /patri/ and /parti/ are syllabified as in (5).

So far, how a word-internal consonant cluster is projected to constituents has been explained. All forms of government, i.e. constituent and interconstituent government, enable us to exclude ambiguity in syllabification.

Note that the coda is excluded from the syllabic constituents defined above. The post nuclear tautosyllabic consonant is directly associated to the rhyme, without any intervening constituent such as 'coda'.

---

[1]See KLV (1990) and Harris (1990) for detailed discussions of charm values and the governing relations between consonantal segments.

(6) a. 

b. 

The reason the coda is not a syllabic constituent may be given as follows. All three constituents R, N and O are head-initial governing domains. If the coda had the status of a constituent, it too would be expected to be a governing domain i.e. the coda has to allow the possibility of branching as all the other constituents may. For example, consider the word <u>part</u>. If the coda branches, the word is represented as (7):

(7) 

Segments associated to the branching coda suggest head-final government; the potential governor, is preceded by a potential governee. Recall that constituent government is universally head-initial. If the coda were a constituent, the right-to-left direction of government would be a reversal of that found in the other three constituents. Also note that both the coda and the nucleus are dependents of the constituent rhyme. The head of the rhyme, the nucleus, must govern the rhymal complement (4b). However, the condition of strict locality between the nuclear head and its complement is violated in (7). Then, one might propose stipulation that the coda may not branch; however, there is no apparent reason why the coda should be an exception as the only non-branching constituent.

I have discussed how the rhymal complement is projected to the constituent. The rhymal complement position is governed by a consonant in the following onset (4e), while the same position is simultaneously governed by the nuclear head (4b). This means that the rhymal complement is governed by two positions. Therefore, a word-final branching rhyme has to be ruled out, since there is no following onset to govern the rhymal complement. This is the case in any language, and in the next section, I explain how Government Phonology deals with apparent word-final branching rhymes.

1.1.1.4. Word-final consonants

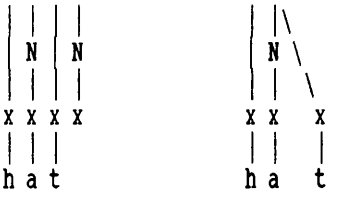
In the theory of government phonology, a domain-final branching rhyme is ruled out, following the Coda Licensing Principle proposed by Kaye (1990a).

(8) **The Coda Licensing Principle** (Kaye 1990a)

A post-nuclear rhymal position must be licensed by a following onset.

It follows from this principle that a word-final branching rhyme is not permitted, since there is no following onset to license the rhymal complement. For example, I take the English word hat which phonetically ends with a consonant. Following the Coda Licensing Principle, hat is represented as in (9a). The word-final consonant t is associated to an onset which is followed by an empty nucleus. As shown in (9b), since there is no following onset to license the post-nuclear rhymal position, the word does not have a branching rhyme in the domain (word) final position.

(9) a.



b. *

This means that all words in all languages end with a nucleus, and whether the nucleus may be empty or not depends on the relevant parameter setting for the language in question. To be precise, the domain-final empty nucleus, is subject to the Phonological ECP (KLV 1990, Kaye 1992), from which I have extracted only the relevant portions. It is this principle that determines whether or not an empty nucleus is phonetically realised.

(10) **The Phonological ECP**
A P-licensed (empty) category receives no phonetic interpretation

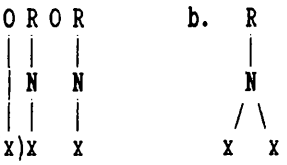
P-licensing
Domain-final (empty) categories are P-licensed
(parameter: **true** German Polish Arabic, **false** Italian Japanese Vata)

For example, German, Polish, Arabic, and also English are languages with the parameter set to 'true', i.e. their domain-final nuclei are P-licensed, which means that in these languages, a domain such as a word may end phonetically in a consonant. On the other hand, languages such as Japanese, Italian and Vata, do not license domain-final nuclei, and words in these languages must end in an audible vowel.

I have discussed all the constituent and interconstituent governing relations except for the one which exists between adjacent nuclear positions (4c&d). In the next section, a nuclear sequence and its associated governing relation are discussed.

1.1.1.5. Government between two nuclear points

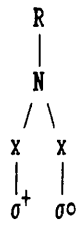
This section discusses the governing relation between two adjacent nuclear positions. There are two structures to consider: i) two nuclei in a row (11a), and ii) two positions associated to one nucleus (11b).

(11) a.


b.

To begin, I shall discuss a branching nucleus (11b). Recall that constituent government is head-initial. To fulfil the Left-to-Right directionality, within a branching nucleus, a potential governor has to precede a potential governee. Segments contained within a branching rhyme as in (11b) must conform to the following charm requirement:

(12)



The representation in (12) illustrates the charm configurations of a heavy diphthong. The head position is occupied by a positively charmed segment, which governs a neutral segment to its right. To show how actual vowels are contained within the branching nucleus, below I briefly outline charm theory.

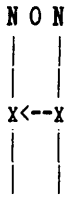
KLV (1985) claims that the primary unit of a phonological segment is the ELEMENT, and all segments are either elements themselves or combinations of elements. For instance, a vowel is an expression containing one or more of the three elements I∘,U∘,A+ (where ∘ denotes neutral charm, and + positive charm) which are independently pronounceable as i,u,a respectively. In combination, non-peripheral vowels may be obtained: for example, e is composed of A+ and I∘ (A+.I∘), and o is composed of the combination (A+.U∘).

Now I consider what kind of segments the positions in a branching nucleus are required to dominate. The governee has to be neutrally charmed (KLV 1990), while the governor has to be a charmed segment (KLV 1990) or has to be more complex i.e. the segment must contain more elements than the governee (Harris 1990). Constituent government is head-initial, so the right-most position of a branching nucleus has to be a potential governee which dominates a neutral simplex segment, i or u. Also, in another case the two positions may dominate one single segment i.e. to form a long vowel.

I have discussed the governing relation between two nuclear positions which are associated to two separate nuclei. An explicit example of government between two separate contiguous nuclei is found in Vata, an Eastern Kru language spoken in the Ivory Coast (Kaye 1982). In Vata, a non-simplex and/or charmed segment occurring to the left in a sequence of two adjacent nuclei, assimilates to the vowel to the right. This is due to head-final inter-constituent government, maintained between the two contiguous nuclear positions. For example, in a vowel sequence ia as in n yi aba 'I know Aba (yi 'know')', the sequence remains unaltered in its surface form: the head-final nature of inter-

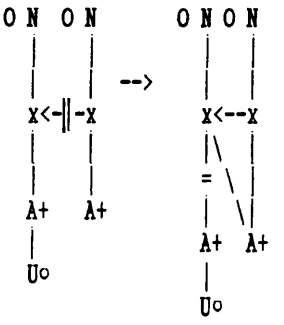
constituent government is fulfilled, because the segment to the left is neutral and simplex, which may be considered an ideal governee. However, if the segment on the left is non-simplex and/or a charmed segment, head-final government cannot be established. So, in order to maintain the governing relation, the segment on the left is deleted and into this position the segment contained in the nucleus to the right propagates. In n no aba 'I hear aba (no 'hear')', o which is more complex than a is deleted and a spreads as the manifestation of inter-constituent government.

(13)a.



[ia]

b.



[o+a] [aa]

So far, I have discussed how constituents contract licensing and governing relations within the O-R constituent pair, and across pairs.

Now I turn to the topic of how the nuclear heads (the heads of each O-R pair) contract licensing relations at nuclear projections, in a word/domain.

1.1.2. Government at the projection level

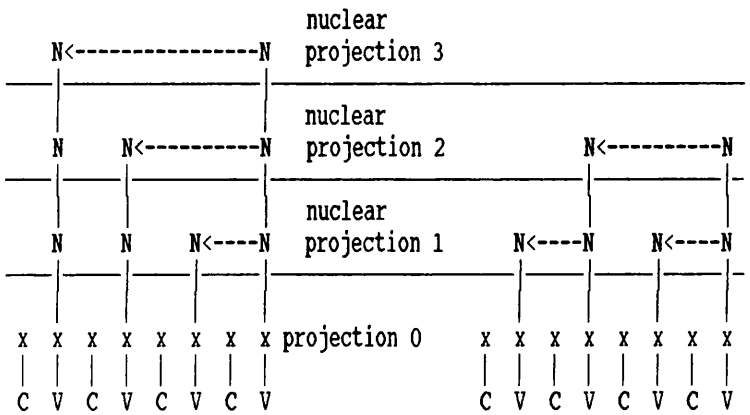
1.1.2.1. Government at the nuclear projection

In 1.1.1, I outlined government and licensing at the skeletal level, or projection 0. All the positions except the nuclear heads are licensed at the projection 0. Now I focus on how nuclear heads are licensed. To license the nuclear heads, the level of nuclear projection is proposed. Kaye (1990b) proposes that various "prosodic phenomena" such as stress systems, vowel harmony, tonal phenomena and syncopation effects, are the manifestation of licensing at the nuclear projection. At

this level, licensing is subject to locality as before, but not strict locality. Whereas government at projection 0 is strictly local and strictly directional, at the nuclear projection level, however, the positions which contract licensing relations are only necessarily adjacent on that projection. At projection 0, they are in general not adjacent[2] since they are separated by an onset position (and perhaps a rhymal complement position) (see (14)). Directionality is generally Right-to-Left; however, it may well be parameterised at the nuclear projection. For example, Vural (forthcoming) claims that in Turkish Vowel harmony, the licensing at the nuclear projection is head-initial.

In metrical terms, Kaye (1990b) proposes binary and unbounded structures as follows (assuming licensing relation to be head-final):

(14)a. b.



Note that at any level of nuclear projection, the licensing relations are binary.

The unbounded configuration (14a) is manifested in the case of harmonic structures (Kaye 1990b) such as vowel harmony. I shall demonstrate briefly how the configuration in (14b) is realised in phonological processes, since metrical structure which is central to my analysis of pitch accent assignment is the manifestation of the type of licensing shown in (14b). To begin, in order to clarify the difference between the configurations in (14a) and (14b), I outline how the configuration in (14b) manifests itself in vowel-zero alternations.

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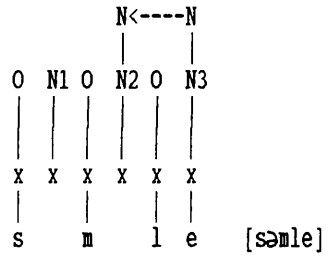
[2]When two nuclei are adjacent at projection 0, they contract government at that projection (see (4d)). This interconstituent government differs from the government which all the nuclear heads contract at the nuclear projections.

The binary configuration in (14b) is found in the vowel-zero alternations of, for example, Moroccan Arabic (Kaye 1990b), French (Charette 1991) and Tonkawa (Y.Yoshida 1990). Depending on the parameter setting of the language in question, the vowel which alternates with zero varies. In French, schwa alternates with zero in some contexts. Following Kaye (1990b), Charette (1991) claims the schwa-zero alternation involves government at the nuclear projection, termed proper government[3]. When an empty nucleus is properly governed by the following nucleus, it is inaudible. However, if the empty nuclear position is not properly governed, the nucleus is interpreted as schwa. The relation of proper government is defined as follows:

(15) A nucleus α properly governs β iff
i) α governs β
ii) α is not itself licensed (it has phonetic content).

As an example, I take the French word <u>semeler</u> [səmle] 'to sole' to show how proper government operates.

(16)

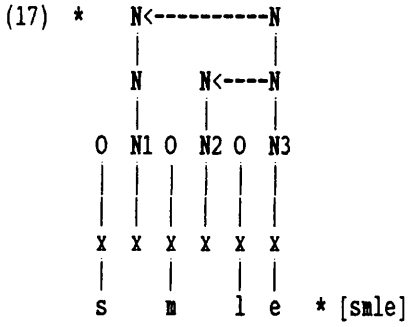


N1 and N2 are lexically empty. N2 is properly governed by N3 which is a potential governor. N2 is properly governed, so it receives no interpretation. N2 is empty and is not a potential governor for N1. N1 cannot be properly governed by N2, and accordingly, remains unlicensed and is interpreted as schwa.

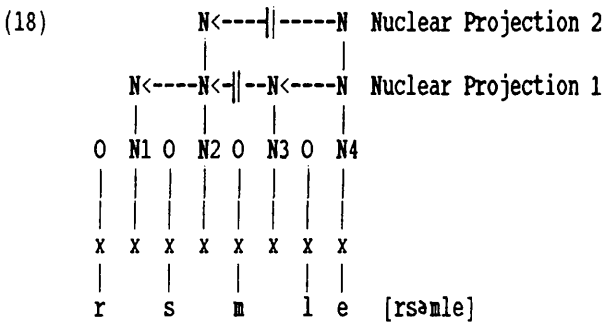
Note that the vowel-zero alternation is not the manifestation of an unbounded configuration (14a). In an unbounded configuration, the domain-final nucleus is the governor which governs all the

[3]Note that phonological government is one form of licensing. Two types of government (constituent and inter-constituent government) which operate at the skeletal level are discussed in 1.1.1. In addition to these two, there is another form of phonological government defined in the theory. This government/licensing is called proper government. The term government refers only to the three listed above.

other nuclei in the domain, one nucleus per nuclear projection. If both N1 and N2 are properly governed by N3, the result is as follows:



In the (14b) type of configuration, more than one governing relation may exist at one nuclear projection; for example, ressemeler [rsəmle] 'to resole':



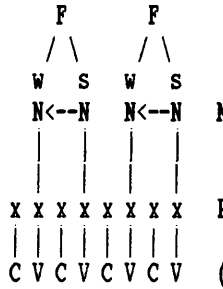
At the nuclear projection 1, there are two binary governing relations. N4, which is a potential governor, properly governs N3. The latter, N3 which is an empty nucleus, remains empty, and it cannot be the governor for N2. As a result, ungoverned N2 receives phonetic interpretation and is a governor for N1. The governors at the nuclear projection 1, N4 and N2 are projected to the nuclear projection 2 where no government applies in French (Charette 1991).

I have thus shown the effect of a binary configuration of licensing at the nuclear projection.

Further, I briefly indicate that metrical structure is viewed as the manifestation of the binary configuration of inter-nuclear licensing relations. That is to say, in government phonology, what is called a foot in metrical terms is not regarded as a constituent. For convenience, however, for the analysis of metrical structure, I employ the term foot to refer to a binary licensing relation

between two nuclear positions. The head of the licensing relation is marked by s (strong), while the licensed nucleus is marked by w (weak).

(19)



NB: F denotes a foot

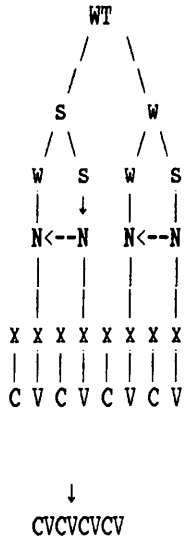
Nuclear Projection 1

Projection 0

(segments: consonants (C) and vowels (V))

The head of the right-headed binary feet are projected to a higher nuclear projection to contract further licensing relations. In Standard Japanese, an accent is assigned to the antepenultimate nucleus of the given phonological string, unless the location of accent is lexically marked (Chapter 3).

(20)



NB: WT denotes word tree
↓ denotes an assigned accent

Nuclear Projection 1

Projection 0

(segments)

That is, an accent is assigned to the head nucleus of the domain. In a domain, all the nuclear positions within the domain have to be licensed except for one nuclear position: the unlicensed position is the head of that domain. I shall expand upon the discussion of accent assignment in Chapter 3.

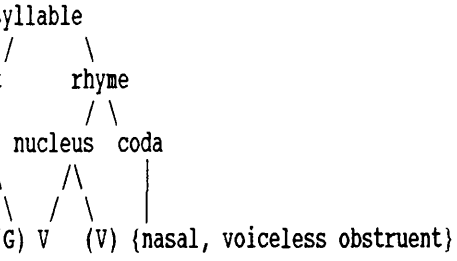
1.2. Constituent Structure in Japanese

The purpose of my thesis is to account for pitch accent phenomena in Japanese, and my analysis involves the government-based constituent structure of Japanese. So, I outline the constituent structure which has been proposed for Japanese by S.Yoshida (1990, 1991), contrasting it with the standard theory of syllable structure, to illustrate the advantages of a government-based approach.

1.2.1. On 'syllable' and 'mora'

First, an argument is given against the proposed constituents 'syllable' and 'mora'. Japanese is classified as a mora-counting syllable language (e.g. Kubozono (1986), McCawley (1968, 1978), Poser (1984), Abe (1987), Shibatani (1990)). For example, heavy syllables such as (C)VV and (C)VC are said to consist of two morae, whereas a short syllable (C)V consists of one (McCawley 1968). To show how the standard theory of syllable structure treats (C)VV and (C)VC sequences, I show the syllable template of Abe (1987)[4].

(31)



In this system, a heavy syllable such as (C)VV which is a long vowel or a diphthong is treated as a branching nucleus, and (C)VN which is a short vowel followed by a so-called 'mora nasal' N [ũ], is analysed as a branching rhyme. However, in Japanese, the two purported branching constituents show behaviour atypical of such constituents. I show an example of pitch assignment in (C)VV and (C)VN sequences.

---

[4]Poser's proposal of syllable structure corresponds to Abe's.

In Japanese, an appropriate tone (pitch) bearing unit, which is a V or N, can either bear a high pitch (marked with a bar over the unit in (32) below), or otherwise, it does not receive any pitch value (see Chapter 3). Units without pitch appear lower than those which are high pitched. To begin, the question arises as to why an N is the only consonant which bears a pitch: some doubt is cast upon the status of an N as a consonant, given its vowel-like behaviour. Even with the stipulation that an N is the only 'consonant' which bear a pitch in the way that vowels do, another question arises regarding the status of N as a rhymal complement. For example, in an alleged tautosyllabic -VV or -VN sequence, the two segments do not necessarily receive the same pitch, contrary to expectation.

(32) a. Long vowel

$\overline{\text{to o}}$ ki 'porcelain'

ko $\overline{\text{o ri}}$ 'ice'

b. Diphthong

$\overline{\text{ka}}$ i gi 'meeting'

ka $\overline{\text{i te}}$ 'buyer'

c. Vowel - 'mora' nasal

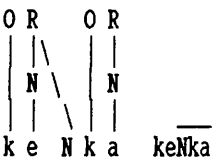
ke $\overline{\text{N ka}}$ 'quarrel'

$\overline{\text{ta}}$ N ka 'unit cost'

Note that there are two units which can bear a high pitch in a heavy syllable. As the example in (32) above shows, two tautosyllabic units do not share identical pitch. One has a high pitch while the other does not have any pitch value (0). In accordance with the standard theory, I assume that the long vowels are syllabified as a branching nucleus (33a), and the vowel-N as a branching rhyme:

(33)a.

b.



If a high pitch is assigned to a syllable, both members (VV or VN) of the heavy syllable are expected to be high pitched, too and keN (HH). However, the actual pitch pattern is H0 in too (33a) and 0H in keN (33b) (where 0 represent tonelessness). Unless we employ another unit to count the tone bearing units within the heavy syllable, this pitch assignment cannot be explained. This is the reason why the 'mora' is proposed for Japanese.

If 'mora' were a significant phonological unit, there would be no need for the (C)VV and (C)VN sequences to be syllabified into a single unit, a syllable; rather two separate units could be employed. However, there remains another question as to why only Japanese (along with a limited range of other languages e.g. Ancient Greek (Hyman 1975), Serbo Croatian (Inkelas & Zec 1988)) employs the unit 'mora'. This fact is undesirable in a framework which looks towards universal phonology as its ultimate goal. I shall show how we can avoid the segregation of certain languages classified as 'mora languages' and account for phonological phenomena within those languages by employing constituents, universal to all languages, i.e. O(nset), R(hyme) and N(ucleus).

In the following sections, I show how 'syllable' and 'mora' are replaced by the use of onset, rhyme and nucleus. S.Yoshida (1990,1991) argues that the 'apparent' heavy syllables (C)VV, (C)VN in Japanese do not consist of single syllables. Instead, these sequences are composed of two OR constituent pairs. Employment of OR constituent pairs enables us to account for phenomena in the (C)VV, (C)VN sequences, within Universal Phonology, without resorting to the 'mora', which is used only for a limited range of languages and therefore has doubtful status.

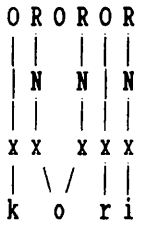
1.2.2. The constituent inventory in Japanese

1.2.2.1. (C)VV sequence and branching nuclei

S. Yoshida (1990,1991) proposes the structure below for 'apparent' long vowels and

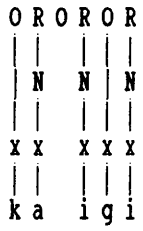
diphthongs i.e. (C)VV. In Japanese, nuclei do not branch (S.Yoshida 1990, 1991). A sequence of two contiguous vowels is syllabified into two separate nuclei (34) (also see 1.1.1.5). For example, koori 'ice' and kaigi 'meeting' are represented as in (34).

(34) a.



[koori]

b.



[kaigi]

This syllabification explains the pitch assignment in these words. It is not because the 'heavy syllable' consists of two 'morae', but because the two nuclear positions belong to two separate nuclei, that the two adjacent vowels have different pitch. If the high pitch is only assigned to the second nucleus of the vowel sequence oo, only the second vowel is high pitched, not the first one. This structure accounts for such pitch accent phenomena without using 'morae'.

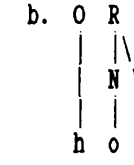
1.2.2.2. Status of N and structure of the rhyme

In this section I show that rhymes in Japanese do not branch. In the standard theory, a -VN sequence is syllabified as a branching rhyme, in which the N occupies the coda position. Also, in the standard theory, there is another situation where the rhyme may branch: a vowel and the initial portion of a geminate consonant (voiceless obstruent).

(35)a.

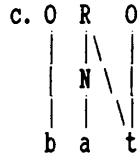
[hoNto] 'real'

b.



[hoN] 'book'

c.



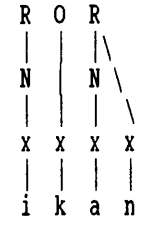
[batta] 'grasshopper'

The constraint where a branching rhyme can appear is discussed by Ito (1986). Japanese words end with

a phonetically interpreted vowel or an N, but not with a voiceless obstruent. A Japanese word may be transcribed with a word-final n which has been called a 'mora' nasal e.g. mikaN 'tangerine'. N is the only 'consonant' which can occupy a coda position, either word-internally (35a) or word-finally (35b). From this coda constraint, Ito (1986) proposed that Japanese allows word-final closed syllables but subject to the condition that N has to be the segment which occupies the coda position. S.Yoshida (1991) cast doubt on this constraint: why should N be the only segment to occur in the word-final coda position? Focusing on the constraint on word-final segments, S.Yoshida (1991) proposes that the (C)VN sequence in Japanese does not involve a branching rhyme. After I outline S.Yoshida's analysis of (C)VN, I briefly introduce my analysis of the sequence, which is borne out by the findings of my study of pitch accent.

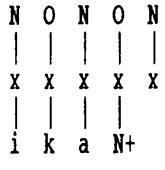
The fact that a word ends with a vowel is explained with reference to a universal principle. As I discussed in 1.1.1.4, Japanese does not allow the domain final category to be P-licensed. Therefore a domain-final nucleus has to be interpreted. Still, the reason N is allowed to occur word-finally remains unresolved. Recall the Coda Licensing Principle (Kaye 1990a), which states that a rhymal complement has to be licensed by a following onset (1.1.1.4). Thus a word-final rhyme does not branch (36).

(36) *



S.Yoshida (1990,1991) claimed that the word-final N is not a rhymal complement but is in fact a nasal element (N+) occupying the onset position (37).

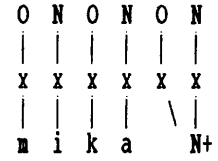
(37)



However, note that the domain-final nucleus is empty in the representation (37). Recall that in

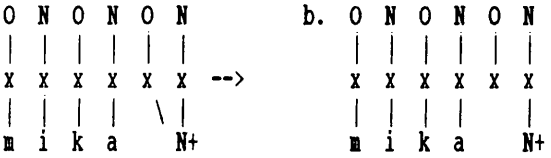
accordance with the ECP, the domain-final empty nucleus is not licensed in Japanese (1.1.1.4): the domain final nucleus cannot be uninterpreted. Therefore, so as not to violate the ECP, the nasal element (N+) spreads to the domain-final empty nucleus (38).

(38)



At the same time, S.Yoshida (1990) proposes that for an onset position to dominate a segment, it must be licensed by the following nucleus that dominates an appropriate nuclear segment, either i, e, a, o or u. Note that the domain-final nucleus of mikaN (38) dominates the element N+ but does not dominate any of the five nuclear segments. Therefore the nuclear point does not license the onset position to dominate a segment/element. Consequently, the N+ element disassociates from the onset position.

(39)a. b.

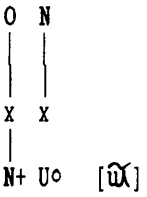


This way, we see that the N is associated to the nucleus, and not to the rhyme. Then, there is no need for the word-final rhyme to branch in Japanese if the -VN sequence is syllabified as a sequence of two nuclei rather than as a branching rhyme.

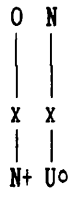
I would like to raise the question here as to why only an onset which dominates N+ can precede an empty nuclear position whereas there is no sequence such as d followed by an empty nucleus. In response, I propose that the nuclear position is not completely empty, but dominates the U° element. Based on the historical development of the negative morpheme from -nu to N, and the fact that N and nu exhibit complementary distribution i.e. nu is almost always accented while N never is, and N never occurs word-initially while word-final nu is rare (Chapter 3), I propose that N and nu in Japanese have in fact one single identity, which in one context appear as nu and the other N. The sequences in question have the following representation (40). Note that the representation of N is

distinguished from that of nu, which typically appear when the sequence bear an accent:

(40) a.

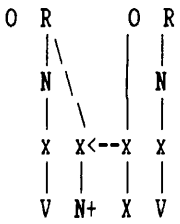


b.



The reader might point out that a word-internal N can be syllabified as a rhymal complement; because the rhymal complement is licensed by the onset position of the following OR pair, the structure does not violate the coda licensing principle. Consider a branching rhyme whose complement position is occupied by N+ element: the rhymal position must be governed by the following onset.

(41)



The assumed structure (41) shows that N is supposed to be followed by an onset position. However, in Japanese, a word-internal N can occur immediately before a non-tautosyllabic vowel (S.Yoshida 1991).

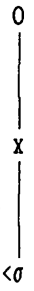
(42) aNi 'easy'
keNeki 'quarantine'

(42) shows that a word-internal N exists without being followed by a non-tautosyllabic consonant. This would mean that the position dominating the element N+ is followed by an empty onset, since, if a N occurs as the complement of a rhyme, it must be followed by an onset. Therefore the word-internal N cannot be syllabified to a branching rhyme.

Another question remains regarding the word-internal N, concerning the homorganic nasal. Nikiema (1988) claims that homorganic nasal-consonant sequences in Italian are manifestations of

transsyllabic government. In a homorganic sequence, a segment (combination of elements) spreads onto the rhymal complement which is already occupied by the nasal element (43):

(43)



However, word-internal N which is homorganic to a stop/nasal consonant that follows the N is proposed as the manifestation of government between two onset positions rather than that between a rhymal complement and the following onset.

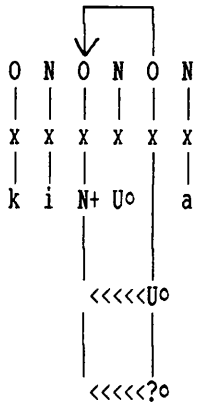
(44)

kiNba	[kimba]	'gold tooth'
kaNpi	[kampi]	'government expense'
neNdo	[nendo]	'the term of one year'
keNtoo	[kentoo]	'consideration'
aNnai	[annai]	'guidance'
aNmitu	[ammitsu]	'bean paste and syrup dessert'
keNgaku	[keŋgaku]-[keŋŋaku]	'inspection'
miNka	[miŋka]	'private house'

The homorganicity results from the head-final licensing relation between two onset positions (S.Yoshida 1990,1991). For example, the homorganic sequence mb results from the spreading of the elements U∘ (labial) and ?∘ (complete closure), which make up the segment b[5] and which spread to the licensed position.

[5]The segment b also contains the L- element, which all the 'voiced' consonants possess. This element is not really relevant to the present discussion. However, briefly, the traditional term 'voicing' is caused by the Bernoulli Effect, indicating no laryngeal activity, which is regarded as the default state of the glottis (KLV 1990). In government phonology, so-called 'voiced' consonants contain the L- (slack vocal cord) element (KLV 1990).

(45)



[kimba]

Recall that in Japanese the onset position cannot dominate a segment unless it is licensed by a nucleus dominating a real nuclear segment (S.Yoshida 1991). When a 'mora' nasal is followed by a stop/nasal, the onset which dominates the stop/nasal licenses the preceding onset (44). The elements[6] associated to the licenser onset spread to the licensee onset. The nasal element combines with the elements of which the stop b is composed, and becomes m. The nuclear position, sandwiched by the two onset positions, is p-licensed by virtue of being within the domain of a licensing relation, and the empty nuclear position (which dominates U∘, but unassociated) is not interpreted (Kaye 1990b).

Without N being a rhymal complement, homorganicity between the N and its following stop/nasal is explained. So far I have shown that the -VN sequence is not tautosyllabic, but is a sequence of two separate OR pairs. Below I consider geminates in Japanese, and to show that these configurations, which were assumed to involve a branching rhyme in the standard theory, are better analysed as non-tautosyllabic sequences.

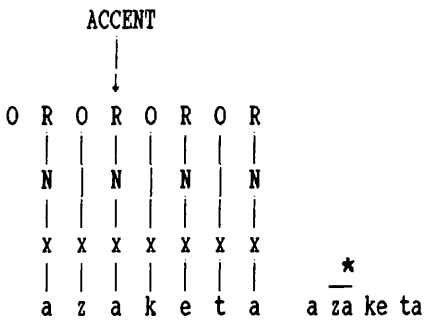
1.2.2.3. On geminate consonants and branching rhymes

Originally, S.Yoshida (1991) claimed that a geminate consonant (except for those in Sino-compounds) occupies two points; a rhymal complement and the following onset. In other words, Standard

[6]I only take the example of the segment b to discuss its constituent elements. For a discussion of other elements contained in various segments, readers should refer to KLV (1990), Harris (1990) and S.Yoshida (1991).

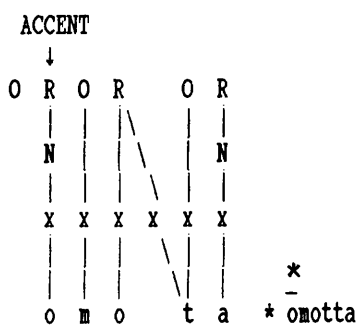
Japanese was claimed to have a branching rhyme. In contrast, Nasukawa (in preparation) claims that all consonant geminates in Standard Japanese, as well as in the Kyoto dialect (Y.Yoshida 1989), and in Sino-compounds in Standard Japanese (S.Yoshida 1991), occupy two onset positions, sandwiching a nucleus which is licensed by them (45b). The structure proposed is supported by the pitch accent assignment analysis, which shows that a geminate in Standard Japanese does not involve a branching rhyme, but involves two onsets. As I propose in Chapter 4, past tense Verbs in Japanese assign an accent on the antepenultimate nucleus, as in any given phonological string without lexical accent in Standard Japanese. For example, azake-ta 'scorn-past' is assigned an accent on the penultimate nucleus, that of za. The accent is interpreted as high tone (Chapter 3), where a bar over segments denotes that the relevant segments are high-pitched.

(46)

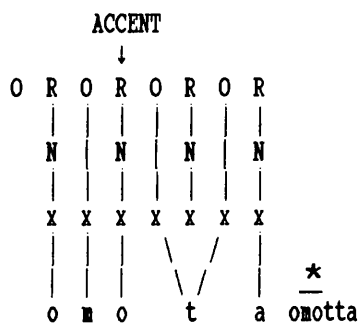


Let us take an example of a Verb which involves a geminate omotta 'think-past', which is given two alternative representations in (47), to compare the two structures of a t geminate. Note that an accent is assigned to the antepenultimate nucleus:

(47) a. rhymal complement and an onset



b. two onsets



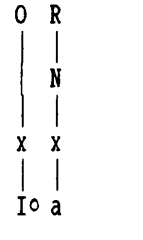
If a geminate were to involve a branching rhyme, an accent would be assigned to the wrong segment (47a). The accent assignment proves that the structure of a geminate involves two onset positions as shown in (47b).

Since geminates were the only case involving a branching rhyme in Japanese, the inter-onset analysis of geminates allows us to exclude branching rhymes in Japanese.

1.2.2.4. Onsets in Japanese

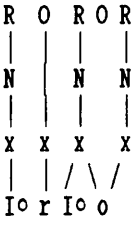
The standard analysis of Japanese allows the possibility of an onset in Japanese to branch, only if the second member is a glide i.e. Cy- sequence. Here I present the problem associated with allowing a glide as the second member of a branching onset. First I discuss how a glide may be defined. A glide can be dominated by an non-branching onset (48a). Another possibility is a Cy-sequence (48b). In Government phonology, y is the I^{o} element which is realised as a glide either when it is projected to an onset or as the first member of a light diphthong (Kaye 1989). I show how S.Yoshida (1991) represents glides.

(48) a.



[aya] 'design, figure'

b.



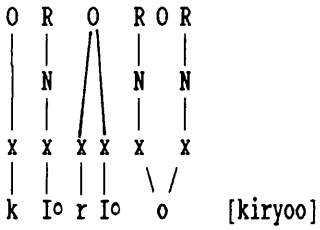
[kiryoo] 'personal beauty'

A light diphthong is associated to a single nuclear position (48b): I^{o} cannot be syllabified as the initial member of a branching nucleus (1.1.1.5), so it cannot be dominated by an independent position within the nucleus.

The volitional form of the verb kir- 'to cut' illustrates why the glide of the suffix yoo cannot be syllabified as the second member of the branching onset (S.Yoshida 1991). If a glide is a potential member of the branching onset, in kir-yoo 'to cut -volitional' there is no reason to rule out the

following:

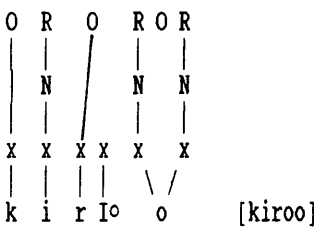
(49)



[kiryoo]

Note that in the light diphthongal analysis of the Cy- sequence (48b), the Io is not dominated by an independent position (x), but rather it is attached to the following nucleus. Unlike the light diphthong, the Io of the volitional -yoo is dominated by an onset position lexically. Therefore, the second onset in (49) has to choose which position is to be projected, the choice being between those dominating r and Io.

(50)



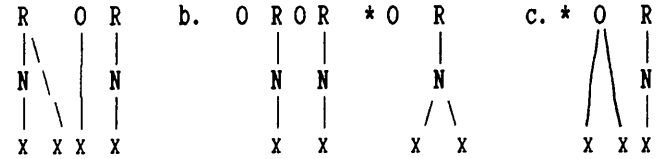
[kiroo]

Now we see that Japanese does not allow an onset to branch.

1.2.3. Japanese and Language Typology

So far, the 'syllable' inventory of Japanese has been discussed. To sum up, Japanese has no branching constituents, i.e. no branching rhyme (51a), no branching nucleus (51b) nor branching onset (51c).

(51)a. * O R O R b. O R O R * O R c. * O R



A typology of languages can be set up, according to their 'syllable' inventories. For example, as we observed in section 1.1.1.3, French is a language that has a branching rhyme and a branching onset; however, in general, whether a language has branching constituents or not depends upon the relevant parameter settings for that language. In accordance with the parameters, languages are classified into five groups, depending on how the constituents branch. The correlates of the existence of branching constituents are discussed in Kaye (1985, 1989), S.Yoshida (1991), namely that if a language has a branching onset, then the language must also have a branching rhyme. The following table presents the five classes of 'syllable' systems in accordance with how a language chooses its 'syllable' inventory (Kaye & Lowenstamm 1981).

(52)

	Class 1	Class 2	Class 3	Class 4	Class 5
Branching Rhyme	-	+	+	+	+
Branching Onset	-	-	+	-	+
Branching Nucleus	-	-	-	+	+
Languages Examples	Vata Desano Lingala Japanese	Quechua	French (European) Italian	Hungarian Wolof	English German Portuguese

Having no branching constituents, Japanese is categorised in class 1.

CHAPTER 2

Previous Treatments of Pitch Accent in Japanese

2.0. Introduction

In this chapter, I outline previous treatments of Japanese pitch accent phenomena, in order to gain an insight to the background of the topic and to highlight the problems I will address in this thesis. This chapter is divided into two parts. The first part is devoted to a demonstration of the interpretation of pitch accent and pitch patterns under various different approaches, e.g. an autosegmental treatment (Haraguchi 1977, 1989, 1991, Poser 1984) and a metrical treatment (Abe 1987, Haraguchi 1991). In the latter part of the chapter, I illustrate accent assignment in compound nouns as proposed by McCawley (1968, 1977), Okuda (1972), Higurashi (1983), Poser (1990) and Haraguchi (1991).

2.1. Facts About Pitch Accent and Pitch Pattern in Japanese

To begin with, I present a set of data to illustrate the general formulation of pitch patterns in Standard Japanese. Theoretically, a lexical accent may land on any one of the vowels in a word. However, in Standard Japanese, if a word consists of three 'syllables (in traditional terms)' or less, the lexical accent location is random, unlike longer words whose accent location is predictable (Haraguchi 1991). Also, it is said that there is class of nouns without lexical accent. Accordingly, let n be the number of 'syllables' in the noun: where $n \leq 3$, there are $n+1$ accentual possibilities. I present trisyllabic words because they are long enough to effectively illustrate the general formulation of the pitch pattern. According to the pitch patterns, all trisyllabic words are categorised into the following four ($n=3$, $n+1=4$) groups. Example (1) namida is an initially accented noun, (2) tamago is a medially accented word, and (3) takara is a finally accented word. The accent

is marked with *, on the accented segment. Finally, turning to (4), kuruma is an accentless noun. All the classes of nouns are shown, in isolation, and with two particle types which are -ga, a nominative marker and -no, a genitival marker. A bar over a syllable indicates that the syllable is realised as high pitched, and a syllable without a bar shows that it is realised without any pitch.

```
        *
(1) a. n a m i d a   'tear'    Note: ga (nominative marker)
                                     no (genitival marker)
    b. n a m i d a g a
    c. n a m i d a n o

          *
(2) a. t a m a g o   'egg'
    b. t a m a g o g a
    c. t a m a g o n o

             *
(3) a. t a k a r a   'treasure'
    b. t a k a r a g a
    c. t a k a r a n o

(4) a. k u r u m a   'car'
    b. k u r u m a g a
    c. k u r u m a n o
```

Note that the pitch pattern is predictable if the location of the accent is known. From the designated 'syllable', the accented one, all the 'syllables' to the left except for the word-initial one are high-pitched.

Based on the fact that some segments are high-pitched, whereas others are not, two distinctive pitches were assumed to exist (Haraguchi 1977). For example, the pitch pattern of tamago was described as LHL; only the 'syllable' ma has a bar over it, meaning that it is realized as high-pitched, and the remaining 'syllables' without bars were said to be low-pitched. This two pitch realization had led to the postulation of two distinctive autosegmental elements, H (high tone) and L (low tone), known as 'Two Tone Theory' in previous analyses (Abe 1985, 1987, Haraguchi 1977, 1988, 1991, Poser 1984).

To illustrate how previous analyses of pitch accent and tone phenomena have been carried out, among the competing analyses of the tone harmony process in Japanese, I shall outline the autosegmental approach of Poser (1984) and two distinct metrical approaches by Abe (1987) and Haraguchi (1991).

2.2. An Autosegmental Tone Harmony Approach

To start with, I shall show an autosegmental account of pitch accent and tone by Poser (1984). Before the rules and their order of application are presented, the units which carry accent and tones are explained.

2.2.1. Tone Bearing Unit (TBU)[1]

Poser's analysis involves both syllables and morae as units which bear tones. A mora consists of either (C)V (a short syllable), N (a mora nasal) or the first half of a geminate

[1]This is the term Haraguchi (1977) employed for the pitch accent analysis and is used by other phonologists who have worked on Japanese pitch accent e.g. Poser (1984).

consonant. A short syllable (C)V consists of one mora, whereas a heavy syllable, (C)VV, (C)VN or (C)VC, consists of two morae (McCawley 1968). A mora is regarded as an important unit in discussions of pitch accent and tone in Japanese (McCawley 1968, Poser 1984, et al). Poser claims that both syllables and morae play a role in tone assignment: a syllable is the unit of accent assignment, and a mora is the unit on to which tones spread. In this section, I shall merely mention that the TBU changes after the accent is interpreted as H tone, in the course of derivation. This shift of TBU is necessary to illustrate the irregular behaviour of heavy syllables. Then, I explain why this shift of TBU was needed in Poser's system (2.2.3) after I discuss all the rule applications (2.2.2).

2.2.2. Rules and their ordering in Poser's account

Poser's rules of tone assignment are summarized as follows:

(5) 1) Initial Low Insertion
2) Initial Low Linking
3) High Tone Insertion on Last Mora
4) Leftward Spreading of High Tone
5) Post-Accentual Low Insertion
6) Linking and Spreading of Post-Accentual Low Tone

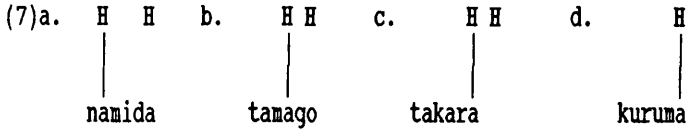
Poser (1984) does not give non-linear representations of rule application and derivation. However, to illustrate the interaction of rules clearly, I represent the process in a non-linear way. Poser (1984) claims that H tone is the immediate realisation of a pitch accent, a claim with which I agree to some extent: my claim differs from Poser's in that I believe that the entire high-pitch realisation within a word, not only the accented 'syllable', is the interpretation of pitch accent (see 3.2.2 for a detailed discussion). H is represented above the lexically accented syllables (6abc).

(6) a. H b. H c. H d.

n a m i d a t a m a g o t a k a r a k u r u m a

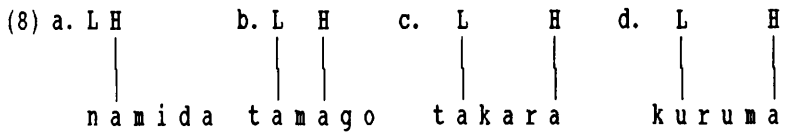
For lexically unaccented words, such as kuruma, Poser postulates a rule '3) High Tone Insertion on

Last Mora' (7d). In fact, this rule 3) is applied to all words, and if the word is accented elsewhere, the leftmost H remains and the other H disappears: an extra rule 'Accent resolution' is suggested.

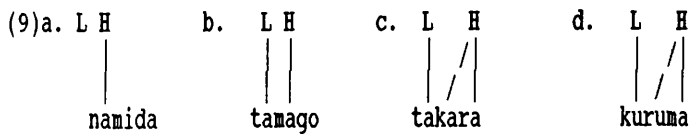


After all the lexical rules (accent assignment) are applied, the TBU shifts from syllable to mora (Poser 1984), in order for a H tone to spread to the correct segments, which I explain in detail in 2.2.3. TBU shift is partly motivated to assign L tone only to the word-initial mora, and not to the syllable (2.2.3 for more detail).

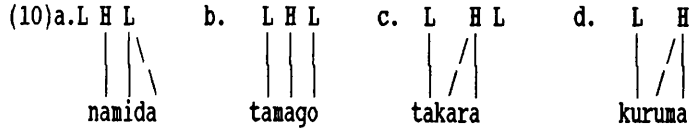
Since the initial mora is always realized as low toned, unless the mora itself is accented, L is inserted onto the initial mora by '1) Initial Low Insertion' and '2) Initial Low Linking' rules. 1) and 2) may well be conflated into a single rule (Poser 1984). This L insertion prevents the 'Leftward Spreading of High Tone' rule from applying to the first mora. This L tone is treated separately from other L tones that appear post-accentually.



Let us see how H tone realisation is assigned to a noun, by rules 3) and 4) above. The rule '4) Leftward Spreading of High Tone' spreads the H to neighbouring syllables: this is well illustrated in (9cd) in which H tones that are associated to final syllables spread over to the preceding morae.

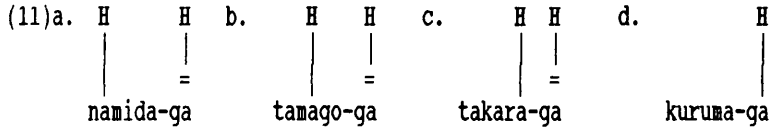


As for post-accentual L tone, a default L tone is inserted onto the mora following the accented one, and the L tone spreads automatically to the right. The default tone rules '5) Post-Accentual Low Insertion' and '6) Linking & Spreading of Post-Accentual Low Tone' are applied as follows:



The tone patterns of trisyllabic nouns are derived as above.

Next I focus on how the rules are applied when the nouns are Case-marked. When the subject marker is added, the '3) High Tone Insertion on Last Mora' rule is applied, and a H is added. This insertion results in a domain with two H tones, if the noun is accented. In the domain, only the left-most H remains.



Once the H tones of the domain are determined, the rules above assign tones to a given phrase, in the way explained for individual nouns.

The genitival marker -no is known as a particle which behaves differently from other particles such as -ga (nominative) and -o (accusative). This particle is said to erase the lexical accent of finally accented words (McCawley 1968, Haraguchi 1977, Poser 1984). Note that accentless words and finally accented words have the same tone pattern, when they are followed by -no. In other words, a word with a lexical accent on the final syllable (12a) behaves like an accentless word (12b).

(12) a.

	i.	ii.
	H	H
	takarano	takaraga
b.	i.	ii.
	kurumano	kurumaga

Note that the tone pattern repeated above (12ai) is exactly like that of an accentless noun with -ga and -no (12b).

From the fact that the finally accented nouns behave like accentless nouns, to account for -no suffixed noun phrases, a 'Pre-no Deaccenting' rule is postulated to remove lexical accent from a noun whose accent is on its last 'mora' (13c).

(13)a. H H b. H H c. H H d. H

namida-no tamago-no takara-no kuruma-no

This 'Pre-no Deaccenting' rule is prescribed to apply to the TBU 'mora', not to 'syllables' for the reason I outline in the following section (2.2.3).

2.2.3. On the shift of TBU

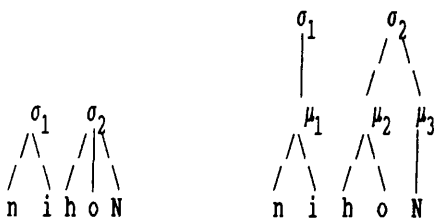
The shift of TBU is necessary to prevent the 'Pre-no Deaccenting' rule from applying to a word whose final syllable is an accented heavy syllable. Heavy syllables contain two morae (C)VV, or involve a moraic (syllabic) nasal (C)VN. When a heavy syllable is accented, the accent is on the first mora of the syllable (McCawley 1968). Compare (14a) and (14b); in (14a), the final syllable of the noun is not heavy, and the 'Pre-no Deaccenting' rule applies, but not in (14b) where we find a heavy final syllable'.

(14)

a.	H a t a m a 'head'	H H a t a m a -n o
b.	H s e N s e e 'teacher'	H H s e N s e e -n o
c.	H n i h o N 'Japan'	H H n i h o N -n o

For example, if a word has a heavy syllable, the syllable is considered to have two morae.

(15) a. two syllables b. three morae



[nihoN] 'Japan'

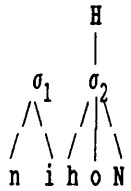
In (15a), nihoN is syllabified into two syllables: a short syllable ni (σ_1), and a heavy syllable hoN (σ_2). It is to this form that lexical rules are applied, to assign an accent to the word. An accent is on the second syllable, and if the syllable is heavy, an accent is placed on the initial mora within the heavy syllable[2]. Once the accent is assigned, the TBU shifts from 'syllable' to 'mora'. When the post-lexical rule is applied, the same word is divided into three 'morae' (15b). The heavy syllable σ_2 contains two morae μ_2 and μ_3.

By means of tone bearing unit shift, we can block the application of the 'Pre-no Deaccenting' rule. Indeed, if the tone bearing unit were to shift from syllables to morae, in the following case, the application of the rule is blocked. The 'Pre-no Deaccenting' rule is applied only to a word that

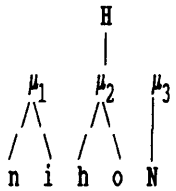
[2]As I discuss in Chapter 3 (3.3.1), an accent is not placed on the second member of a 'heavy diphthong' or apparent 'long vowels', but this does not apply to all vowel sequences. Note that McCawley (1968) claims that the second mora of a heavy syllable never bears an accent, and Poser (1984) adopts the same idea.

has its accent on the final tone bearing unit.

(16) a. lexically (two syllables) TBU is a syllable



b. post-lexically (three morae) TBU is a mora

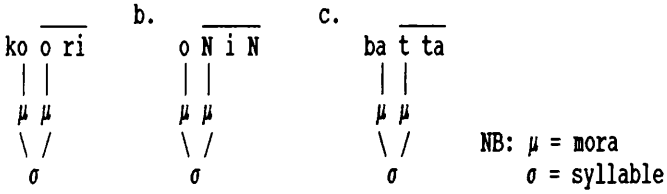


[nihoN] 'Japan'

If the tone bearing unit is a syllable, nihoN is a finally accented word. Being a finally accented word, nihoN should be subject to the 'Pre-no Deaccenting' rule. However, Poser claims that the rule is not applied to the word, since, by the time this post-lexical rule is applied, the tone bearing unit has shifted to the mora (15b), and nihoN is not considered a finally accented word. The accented mora is μ_2, the head of σ_2, and μ_2 is not the final mora of the word. Considering that the deaccenting rule is applied only between the particle and its immediately preceding mora, the application of the rule is blocked. Poser's proposal predicts that a word like nihoN, whose final syllable is heavy, is not deaccented when the particle -no follows it.

The shift of TBU does serve another purpose. That is, it assigns L tone only to the first mora (C)V of a word-initial heavy syllable (C)VV, (C)VN, (C)VC, but not to the syllable:

(17) a. b. c.



To assert this restriction on initial heavy syllables, the 'Initial Low Insertion' rule has to be applied when the heavy syllables are interpreted as two separate morae. This implies that the shift must occur before the 'Initial Low Insertion' rule.

2.2.4. Problems with Poser's rule system

Certainly, this set of rules derives the desired pitch patterns. However, there are several points to be considered: 1) the source of L tone 2) the reason a H spreads from right to left while a L spreads from left to right, 3) whether the distinction between syllable and mora is necessary, and why the tone bearing unit has to switch from one to the other in the course of derivation.

The first question arises from my claim that a pitch accent language like Japanese has a source of high pitch i.e. accent, but the same thing cannot be said of a L tone. As I propose in the section devoted to a government based analysis, I believe that Japanese, a pitch accent language, has only one pitch, high pitch which is the immediate interpretation of pitch accent, which may be shared by the neigbouring segments. All lower pitch realisations arise from the absence of tonal value. In other words, the so called L-pitched syllables are toneless.

This absence of another (other) tone(s) gives rise to a crucial difference between a pitch accent language like Japanese, and pure tone languages, which are frequently equipped with two or more distinctive tones as well as so called contour tones, which may be described as tone sequencese attached to single segments. For example, the information that pitch contributes a given phonological domain is different in Japanese and Chinese, as McCawley (1968) mentions;

> ....Note, however, that the type of information manifested by pitch in Japanese is of a completely different nature from that in a true tone language such as Chinese: in Japanese the information which the pitch gives about syllables is merely the answer to the question 'Is this the accented syllable?', a question to which the answer is either yes or no, for which the answer will be 'no' for all but one of the syllables; in Chinese, on the other hand, the information which the pitch shape of the phrase carries about each syllable generally is not the answer to a single 'yes or no' question; furthermore, whereas in Japanese an answer of 'yes' for one syllable implies that the answer will be 'no' for <u>all</u> other syllables in the phrase, information about a syllable in Chinese will imply little or no information about the other syllables in the phrase, and even then only about the <u>immediate</u> <u>adjacent</u> syllables (for example, the fact that one syllable has 'third tone' implies that the following syllable cannot have 'third tone' but has absolutely no implication about the syllable after that). Thus, pitch in Japanese expresses merely a location, whereas pitch in Chinese expresses features of individual syllables.
>
> (McCawley 1968)

The point is, in Japanese, in a domain such as a word, there is at most one designated syllable which

is accented, and all the other syllables of the domain are unaccented. It is this information that the accent conveys.

Following McCawley, I suggest that Standard Japanese has high pitch only, which is the immediate interpretation of the pitch accent. And in the word as a whole, the high pitch which originates in the accented vowel and which is shared by neighbouring vowels, is the interpretation of the pitch accent. Unlike Chinese, a tone language, there is no source for L tone in Japanese. Then, segments which are not subject to high-pitch interpretation are simply toneless. I assume that those segments which are not high pitched/toned do not have to be 'filled' with another tone value. To call what is not black, white, without evidence is false logic. In the same manner, one cannot define the TBUs without H tone as L toned. There is no evidence of 'L' being an active ingredient in any Japanese phonological unit.

The second question is how the directionality of tone spreading is determined. From Poser's analysis, H tone spreads to the left, and L tone spreads to the right, but there is no apparent reason why this should be so. Poser claims that H tone spreads automatically towards the left, but the reason for this is not explained. I mentioned that there is no evidence for the presence of L tone: even if there were L tone, there is still no reason for the tone to spread to the right rather than to the left. As I claim in Chapter 3 (3.2.4.2), the segments recognised as high-pitched do not involve any structural operation, but manifest themselves as the interpretation of a pitch accent in Standard Japanese.

The third point concerns the shift of tone bearing units. As I outlined in the previous section, Poser proposes that the tone bearing unit has to change from a 'syllable' to a 'mora'. The motivation for this shift of the tone bearing unit cannot remain unquestioned. It seems that the only requirement necessary for a 'syllable' to be a TBU is that an accent should be assigned on the first 'mora' within a 'heavy syllable'. All the other processes apply to morae. To change the TBU from one to the other in the course of derivation is as arbitrary as to state the condition that a heavy syllable always has its accent on the first mora, and not on the second. Suppose we can explain why the second mora of a 'heavy syllable' cannot be accented without resorting to the unit 'syllable'; that is, we can show that the second member of heavy diphthongs and apparent long vowels has a

legitimate reason for not being accented. Then, we no longer need to postulate the syllable or the shift of TBU, and we obtain a less arbitrary system as a result.

In fact, as I demonstrate in detail in Chapter 3 (3.3), a licensed nuclear position does not bear an accent: this includes the second member of a heavy diphthong and an apparent long vowel. Then, we no longer need to establish the identity of the TBU at particular levels of derivation.

2.3. On Metrical Treatment

2.3.1. The metrical theory of Haraguchi (1991)

2.3.1.1. An outline of the analysis

A thorough study of pitch accent and tone phenomena in Japanese by Haraguchi (1977) has been revised in Haraguchi (1991), which incorporates a metrical structure for accent assignment. Apart from the accent assignment process, the tone pattern derivation in Haraguchi (1991) is almost identical to the one in Haraguchi (1977, 1989).

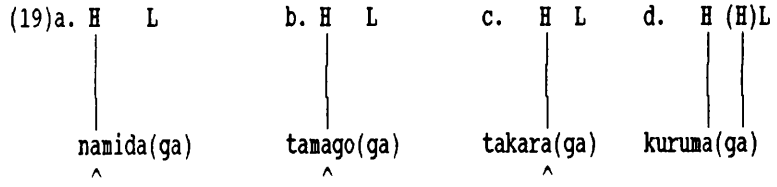
My claims agree with those of Haraguchi (1991) in the following respects: i) the accent in long words (quadrisyllabic or longer) including some compounds and loanwords is predictable, and their accents are usually assigned to the antepenultimate TBU, ii) otherwise the location of accent is lexical i.e. in short native words. My analysis differs from that of Haraguchi (1991) in the way that antepenultimate tone bearing units come to be accented. This difference is discussed in the relevant section (2.3.5). In this section, I illustrate how lexically accented (or accentless) words are assigned their tone patterns in Haraguchi (1991).

A diacritic indicates the location of lexical accent. Then the following tone association process applies to a phonological string.

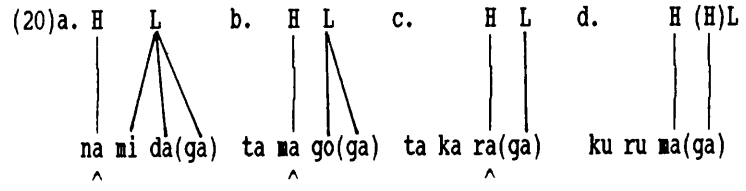
(18) a. Associate the H-tone of the basic tone melody with the main stressed tone-bearing element.
b. Associate the L-tone to every tone-bearing element which occurs to the right of the main-stressed element.
c. Spread the H-tone to the left.
d. Dissimilate the tone of the initial mora with that of the second mora.

Haraguchi notes that (18) is an informal description of both universal principles and the parameters[3] for Japanese. I shall illustrate how this system works using the description (Haraguchi 1991) in (18) above. Haraguchi (1977) sets a basic tone melody (BTM) for each dialect of Japanese, and for Standard Japanese, the BTM is set as HL. In other words, according to Haraguchi, a given word (ie. a noun) in Standard Japanese has a melody HL. This BTM is associated to possible tone bearing units. There are numbers of separate autosegmental levels such as the tonal level and the segmental level. How the BTM is linked to segments is as follows. H tone is the designated tone in Standard Japanese (Haraguchi 1989). The tone linking process follows (18b), the H tone of BTM, HL, is linked to a mora with a diacritic ^ under the accented mora (19abc). And if the noun is not lexically accented, the H is associated to the right-most mora (19d).

The derivation with the particle -ga is shown in brackets.



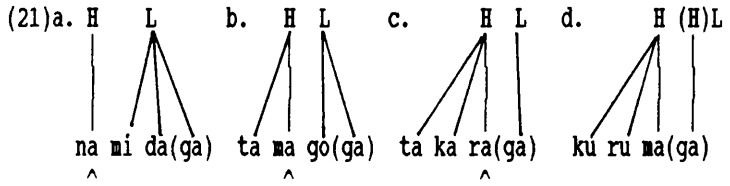
Following (18b), L-tone is associated to every post-accentual tone-bearing element:



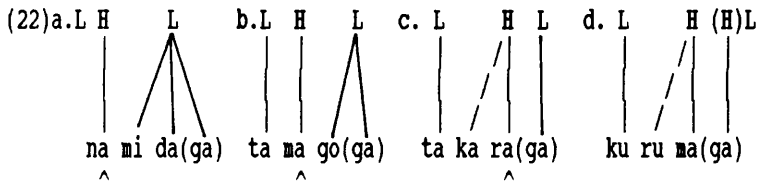
In cases where no tone bearing unit is available for the last tone of BTM, which is L tone, the L tone

[3]Although Haraguchi (1991) does not clearly say, (19) seems to be a simplified description of the principles and parameters proposed in Haraguchi (1989).

remains unassociated, or is deleted by a general principle. (18c) applies to spread H tone.

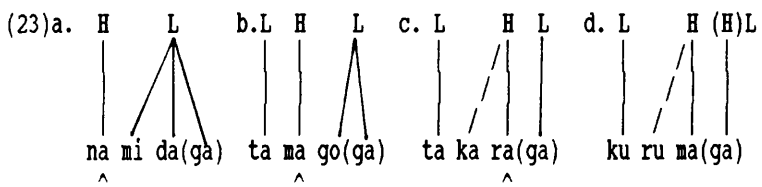


To lower the initial mora, (18d) applies:



In other words, unless the leftmost mora itself is accented, L tone is inserted to the leftmost mora, automatically deleting the previous association line with H tone (Halle and Vergnaud 1982, Pulleyblank 1983, Haraguchi 1989).

Consequently, after applying (18), the correct tone patterns of nouns are derived (23).



2.3.1.2. Some disadvantages of Haraguchi's analysis

As outlined in 2.2.1.1, the system does derive the correct tone pattern. However, I disagree with Haraguchi on the following three issues.

The first point regards the reason the syllable with a diacritic ^ should be associated to the designated tone H. The diacritic shows the lexical accent, which is where the high pitch originates, rather than simply matching the H tone of the BTM.

The second point concerns the L tone in Japanese. The BTM is set as HL in Standard (Tokyo) Japanese. I have claimed that in a pitch accent language like Japanese, H tone comes from the accent,

and that there is no possible source for a L tone (2.1.2.2). The L tone of the BTM cannot be explained. In Haraguchi (1989), the designated tone of Standard Japanese is H. Also, based on his thorough study of Japanese dialects, Haraguchi (1988) claims that no other dialect chooses L tone as its designated tone. I think the fact that all dialects of Japanese have H tone as the designated tone also further supports my argument: the tone bearing units which are not H-toned are toneless. Also, Haraguchi predicts the existence of a Japanese dialect with 'L' as its designated tone. Yet none is attested.

The final point regards the initial tone-bearing unit. The Peripheral Dissimilation Principle assigns L tone to the initial syllable. If, somehow, the spreading of the H tone is stopped from reaching the initial tone bearing unit, for example, as was the case in Poser's system, it is not necessary to associate another tone to a tone bearing unit which is already linked with H tone, resulting in the deletion of the H tone which was already there. I suggest that the initial tone bearing unit is toneless because the domain initial unit is inaccessible (Chapter 3).

2.3.2. Against tone mapping by a metrical tree

To account for the pitch accent and tone harmony process in Japanese, metrical theory has been applied by Zubizarreta (1982), Abe (1981,1987) and others[4]. Their proposals are based on the claim that pitch accent and stress are typologically identical, yet the metrical structure proposed for pitch accent analysis proved to be somewhat different from that for stress phenomena. I take the position that the formalism of stress and pitch accent phenomena is identical, however I disagree with the way a metrical structure is employed in the analysis of pitch accent i.e. to map correct tones to desired syllables (morae).

To explain briefly how a metrical theory was applied to a pitch accent system, I outline the theory of Abe (1981), which was later extended to account for compound nouns (Abe 1987). Indeed, as Poser (1986) pointed out, although Abe's metrical tree predicts the possible tone pattern in a

[4]Other metrical analyses have been proposed by Benette (1981) and Halle (1982).

phonological word (domain), a metrical approach has no great advantage over an autosegmental approach. To explain this point, I show Abe (1987)'s sample derivation of azarasi 'seal'.

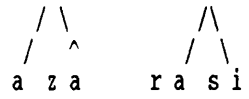
Following Zubizarreta (1979), Abe assumes that the accent is represented by an inherently branching subtree.

(24)
```
    ^
a z a r a s i      (^ is on the accented vowel)

L   H   L   L
```

A metrical tree is constructed so as to satisfy the well-formedness condition (25a), and accordingly we see (25b).

(25) a. A metrical tree is uniquely right branching on the primary level

b.


(25b) is joined into a single tree.

(26)


The next step is to label the tree, so as to represent the accent assignment visually. Two conventions are proposed for labelling the tree: 1) to label the root as High, and 2) to label the first sister nodes [α,β] plus [+] and minus [-] respectively, if α branches.

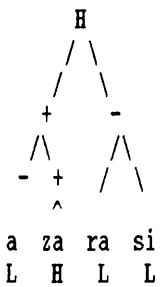
(27)

This representation is read in such a way that the terminal elements dominated by the node labelled as + have that value for the feature High. In other words, in (27), a and za bear H tone. In the same manner, the value minus is given to the terminal elements under the node labelled as - for the feature High. Then, in (27), ra and si are Low toned. Another labelling rule is provided to restrict the initial mora as Low, unless the mora itself is accented.

(28) Initial Lowering: Label α and ß minus [-] and plus [+], respectively, where α and ß are the leftmost sisters, and α and ß are not labelled.

Finally the representation is completed:

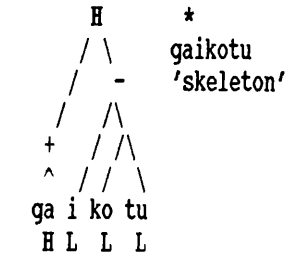
(29)



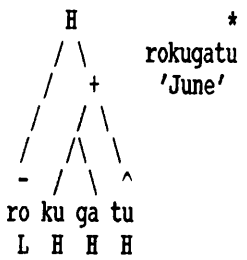
In fact, the set of rules above restricts the tone labelling of words well enough for all accentual types of words. Since a medial accented word azarasi is used above in the sample derivation, I give examples of initial accented, final accented, and unaccented words[5] below from Abe (1987).

[5]Note that there are no finally accented quadrisyllabic native words without internal morphology in Japanese. Abe's examples I show in (30) are all compounds. Perhaps he chose compounds just to show the formulation of how various accent locations in words are represented.

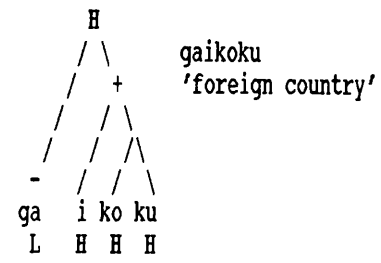
(30)a. initial accented



b. final accented



c. unaccented



As has been illustrated, the tone labelling is successfully carried out by metrical trees. Yet, considering the tree structures above, I believe that there is no great advantage in having a metrical tree, in comparison to the autosegmental treatment outlined in 2.1, for the reasons expounded below.

I should like to raise an issue regarding the function of a metrical tree: I believe that the formalism of stress and pitch accent assignment is identical, and so a metrical tree in pitch accent phenomena should work in a manner similar to that in stress systems. Stress location is predictable unless the domain is lexically marked. As I discuss in Chapter 3, the location of an accent is predicted, but it is unpredictable in cases where the accent location of the words is specified in their lexical representation. If not lexically specified, the accent is assigned to the antepenultimate vowel. Also, the metrical structure I propose predicts the landing site of an accent when the antepreantepenultimate position does not fulfil the condition required for bearing an accent (3.3). I do not believe that the function of the tree is simply to label the terminal elements correctly, even if the tones are assigned correctly to a given string.

I also would like to question the necessity of such metrical trees for Japanese pitch assignment in the light of my claim that high-pitch recognised within a given domain is, as a whole, the interpretation of a pitch accent (3.2.4.2). The metrical structure by Abe is employed to assign

appropriate tones to desired segments. One crucial point about Japanese pitch accent is, once the location of accent in a domain is known, the pitch pattern of that domain is predictable: the accented nucleus and all the segments to its left except for the domain-initial vowel are all high-pitched. This is true for any domain i.e. that of a simplex word, a compound word and merged Phrases in connected speech. I show some examples below; note however, that the purpose of this listing is to show the general formulation of how high-pitch is recognised in the output (external domains). Thus I postpone any detailed discussion of the morphological operation which results in the concatenation of constituents to form the (external) domain, until the relevant chapters (see Chapter 3 for a simplex noun (31a), Chapter 4 for compound nouns and Chapter 5 for connected speech Phrases). Also note that all the accents are marked with ^ under the accented segments in this data in (31). Since I have not discussed how the accents are assigned in any of the domains below, I shall confine my role to a descriptive one, and therefore ^ does not reflect any analysis to be offered in the following Chapters.

(31)

a. a ta ma 'head'
^

b. ya ma ho to to gi su 'mountain cuckoo'
^
(yama 'mountain' + hototogisu 'cuckoo')
^ ^

c. sa ka na -o ta be ru '(I) eat fish'
^
(sakana-o 'fish-acc. + taberu 'eat-nonpast')
^

The entire high-pitch realisation is uniform: from the accented vowel to the left (except for the initial vowel), all are high-pitched within any domain. This uniformity implies that the high-pitch assignment is automatic. In other words, I believe that the high-pitch realised on certain portion of the domain does not involve any structural operation, but stems merely from the nature of the pitch accent. A pitch accent is interpreted as a high-pitch over all segments from the accented nucleus

to the left, but the domain-initial vowel is inaccessible and is unaffected by this high-pitch interpretation of a pitch accent (3.2.4).

To sum up, an autosegmental treatment and a metrical approach such as that outlined above work in a similar manner: in both approaches, desired tone patterns are mapped onto phonological strings via the structural operation proposed within the theory in question.

2.4. On Compound Nouns

Compound nouns have been said to be sensitive to the size of the right-hand term for the purpose of accent assignment. In this thesis I show that such a claim, which makes reference to the size of the subconstituents, is not necessary, and that accent assignment in compound nouns can be accounted for by the set of principles and parameters which is presented in Chapter 3.

As I claim in Chapter 4, accent assignment in a concatenated noun is subject to the precise nature of the concatenation. In other words, it is necessary to recognize more than one type of morphological structure for the concatenated nouns denoted by the term 'compound' employed by Chew (1964), McCawley (1968), Higurashi (1987) and Poser (1990). In this Chapter, I employ the term 'compound' to denote to all concatenated words, as it is used by the authors above to outline their analyses.

2.4.1. Analyses based on morpheme boundaries

It has been said that accent assignment in compounds is sensitive to morpheme boundaries, and also to the size (number of morae) of the final member of the compound (McCawley 1968, 1977, Okuda 1971, Higurashi 1983). Their claim is based on the idea that the accent of the compounds is attracted to the morpheme boundary. There are two types of accent assignment, depending on the size of the final member of the compound. The final member can be 'short' or 'long'. 'Short' means one or two

morae[7], while 'long' indicates three or more morae. If the final member of the compound is short, many of the compounds place the accent on the final syllable[8] of the initial member of the compound. When the final member is long, many of the compounds assign the accent on the initial syllable of the final (right-most) member.

(32) a. H
|
[...σ][μ(μ)]

b. H
|
[σ..σ][μμμ(..)]

σ = syllable
μ = mora

Thus, the rules are differentiated according to the length, or the number of morae contained in the final (right-most) member.

2.4.1.1. Compounds with a 'long' final member

To show the accent assignment in a compound with a 'long' final member, the tone patterns of some compounds are presented.

As was mentioned briefly above, an accent of a compound is placed on the initial syllable (initial mora) of N2, if N2 consists of three or more 'morae'. ^ under a vowel indicates an accent on that vowel ('mora').

[7]Note that the unit used to count the size of the morpheme is 'mora', whereas the unit which is assigned accent is 'syllable' (McCawley 1968,1977, Okuda 1971, Higurashi 1983).

[8]The accent has to be assigned to syllables, to avoid assigning an accent to the second mora of a heavy syllable. For example, an accent cannot be placed on the second V of a heavy syllable (C)VV, or on N of (C)VN (McCawley 1968, 1977).

(33)

	N1		N2		COMPOUND N1-N2
a.	i si	+	a ta ma	--->	i si a ta ma
	'stone'		'head'		'hardhead'
b.	nu no	+	hu ku ro	--->	nu no bu ku ro
	'cloth'		'sack'		'cloth bag'
c.	ki tu ne	+	u do N	--->	ki tu ne u do N
	'fox'		'udon noodle'		'udon with fried bean curd'
d.	sa to	+	ko ko ro	--->	sa to go ko ro
	'village'		'heart'		'homesickness'

The words above are assigned an accent on the initial mora of the right-hand subconstituent of the compound, regardless of the lexical accentuation of either subconstituent term. The initial mora of the right-hand member is located at the morpheme boundary of the compound (see 32b).

However, this description is not complete for a compound with a 'long' final member. There are some compounds with long final members whose accent is respected in compounds: examples of this type of word are listed below. The compound below respects the accent of the final member (N2), and the accent is retained as the accent of the compound.

(34)

	N1		N2		COMPOUND N1-N2
a.	hu yu	+	ke si ki	--->	hu yu ge si ki [9]
	'winter'		'view'		'winter view'
b.	ya ma	+	ho to to gi su	-->	ya ma ho to to gi su
	'mountain'		'cuckoo'		'mountain cuckoo'

[9]Note that in some of the compounds, a phonological process known as 'sequencial voicing' is observed in N2: noun-initial voiceless consonants /k,s,t,h/ become /g.z,d,b/ when preceded by another noun.

Regardless of the accentuation of N1, the accent of N2 dominates the accent of the compound. This class of compounds consistently shows an N2 with initial or medial accent (McCawley 1977).

Rules has been formulated based on data such as those above. The Compound Accent Rule of McCawley (1977) illustrates this clearly.

(35) Compound Accent Rule

In a compound noun [N1 N2] where N2 is three or more morae long,

a) the accent of N2 predominates as the compound accent
(i.e. the accent of N1 is eliminated)

b) if N2 is either accented on its final syllable or unaccented,
put the compound accent on the first syllable of N2.
(McCawley 1977)

The rule captures the generalisation. However, (35b) has to be modified so as to include data like (33d). N2 in (33d) has a penultimate accent, and the accent assignment does not fit either to (35a) or (35b). The compound places the accent on the initial syllable of the N2 portion.

Also, it is true that some of the compounds with a penultimate accented N2 have two alternative tone patterns. They can belong to either the class of (35a) or (35b). Higurashi (1983) gives the alternative tone patterns of compounds, such as:

(36)

na ma	+	ta ma go	--->	na ma ta ma go	na ma ta ma go
'raw'		'egg'		'fresh egg'	

Some of the compounds are classified as belonging to both types, as categorised by rules (35a) and (35b). That is, the postulation of the rules in (35) does not explain the reason why this type of word can have two pitch patterns while most others cannot. I actually believe that there exists a difference in the morphological operation by which the two terms are concatenated, as I discuss in detail in Chapter 4.

The observation of compounds whose second term is 'short' shows that the rules written for them do not explain the accent assignment well enough, and that the size of the constituent terms (short or long) does not contribute to the process by which the accent location of the compound is

determined.

2.4.1.2. Compounds with a 'short' final member

This section discusses compounds whose right-hand term is 'short', to show the clear parallel between the 'two types' of compounds distinguished on the basis of having 'short' or 'long' right-hand subconstituents in the standard analysis. As I mentioned before (2.4.1), in compounds whose right-hand term is 'short', the compound accent is located on the last mora of the left-hand term, regardless of the lexical accentuation of both terms:

(37)

a. hā si + ha kō ---> ha sī ba ko
   'chop sticks' 'box' 'chop-stick case'

b. a būū ra + mu sī ---> a bu rā mu si
   'oil' 'insect' 'cockroach'

c. kā bu to + mu sī ---> ka bū to mu si
   'helmet' 'insect' 'beetle'

d. ha nā + ka tā ---> ha nā ga ta
   'flower' 'shape' 'star (person)'

There is another type of compound whose right-hand member is also 'short'. The right-hand term has the lexical accent on the initial mora which is retained as the compound accent, regardless of the lexical accentuation of the left-hand term:

(38)

a. ta ke + ha si ---> ta ke ba si

'bamboo' 'chop sticks' 'bamboo chop sticks'

b. i wa si + ku mo ---> i wa si gu mo

'sardine' 'cloud' 'cirrocumulus'

c. wa ta + ku mo ---> wa ta gu mo

'cotton wool' 'cloud' 'fleecy cloud'

Thus the two types of compounds listed in (37) and (38) are captured by rules (Chew 1964)[10]: compounds which are accented on the final syllable of the initial member, and those which are accented on the initial mora of the final member. In a compound involving a short N2, Chew's generalisation is as follows:

---

[10]There is another portion of the rule by Chew (1964), which I do not highlight here. The relavant portion states that 'unaccented compounds usually have final accented N2': the following words illustrate this type of compound.

a. yu + ta ma ---> yu da ma

'hot water' 'ball' 'splash of boiling water'

b. si ta + hi ---> si ta bi

'bottom' 'fire' 'burning down'

The words above are not accented, regardless of the left-hand subconstituent. For example, McCawley calls the right-hand term which 'causes' the compound to be unaccented, a 'deaccenting' morpheme. I mention this type of concatenated word in Chapter 4; briefly however, I think it is the morphological derivation which causes the word to be accentless, rather than the lexical feature i.e. 'deaccenting' of the N2.

(39)a. Compounds with accent on the final syllable of N1, usually have unaccented N2.

b. In compounds with accent on the initial syllable of N2, the N2 is accented on the initial syllable.

As Chew's generalisation shows, compounds with short N2 have been analysed such that they are assigned accent depending on the lexical property of N2, without regard to the accentuation of N1. What is common to the analyses of these words by McCawley (1968), Okuda (1971), Higurashi (1983) and Abe (1987), is that the accentuation of the compounds above depends on a particular lexical feature of N2, namely, whether it 'preaccents' (39a) or 'initial accents' (39b). 'Preaccenting' N2 locates the accent of the compound on the last mora of the N1, regardless of the lexical accentuation of N1. 'Initial accenting' N2 is lexically accented on the initial mora, whose accent is respected and maintained as the accent of the compound (regardless of the lexical accentuation of N1). McCawley (1968), Okuda (1971), and Abe (1987) list some examples of both preaccenting morphemes and initial accenting morphemes. However, many of the morphemes belong to more than one class, and it is difficult to define a morpheme strictly as one type. For example, the following word has two accentual patterns:

(40)

a. ni wa ka a me 'shower (short spell of rain)'

(niwaka 'sudden' + ame 'rain')

b. ni wa ka a me

If lexically specified as preaccenting or initial accenting, a word should not have more than one pitch pattern. It is difficult to assert that the accentuation of the compound is determined by lexical feature (such as 'preaccenting', etc.) of N2.

Rather, through observation of the words presented in 2.4.1.1 and 2.4.1.2, we see the parallel between the two distinguished compound types, ones with a 'long' right-hand member and those with a 'short' one. According to whether the right-hand member N2 is short or long, accent assignment in one class of concatenated words respects the lexical accentuation of the N2, while in the other,

an accent is assigned to the antepenultimate vowel (syllable):

(41) a. 'long' N2 : accent on the initial syllable of the N2

[CV..CVCV][CVCVCV]
^

b. 'short' N2 : accent on the final syllable of the N1

[CV..CVCV][CVCV]
^

In both types of words, the accent is assigned to the antepenultimate vowel. Given this parallel between the accent assignment of compounds containing 'long' and 'short' N2s, I shall pursue an account which will unify both groups of concatenated words in Chapter 3 and 4.

2.4.2. Poser's proposal -- foot analysis

This section discusses another analysis of compound accent offered by Poser (1990). Poser proposes that it is the foot structure which determines the accent location of the compound nouns. Poser's analysis provides a reason why, in one type of compound discussed in 2.4.1, whose right-hand member is 'long', the compound accent is assigned to the initial syllable of the right-hand member. However, at the same time, other types of compounds are neglected.

2.4.2.1. Foot structure of Japanese

Poser (1990) has proposed that the accent assignment of Japanese compounds involves foot structure. This claim is founded on an attempt to explain the difference between the compounds with 'short' N2 and those with 'long' N2 (2.4.1). Poser has pointed out that the foot count, that of a bimoraic foot, distinguishes nouns with one or two morae ('short' nouns) from ones with more than two morae ('long' nouns). From the foot count it is determined that the short nouns have only one foot,

whereas long nouns contain more than one. This is the first role that the metrical foot plays in compound accent assignment. The second role of the foot is to assign an accent if N2 is long. The conditions are as follows:

(42) ACCENTUATION OF COMPOUNDS WITH A LONG SECOND MEMBER:

a. Mark the final foot of the second member as invisible;
b. If the visible portion of the second member is unaccented, assign an accent to its initial syllable;
c. Otherwise, leave the existing accent in place.

(Poser 1990: 99)

In addition, he suggests that the direction of foot construction is from right to left. The conditions above correctly assign the accent for compounds with long N2s, which Poser supplies[11]. For example:

(43) a. Accent in original position in N2

i) ya ma + ho to to gi su ---> ya ma ho to to gi su

'mountain' 'cuckoo' 'mountain cuckoo'

ii) hu yu + ke si ki ---> hu yu ge si ki

'winter' 'view' 'winter view'

[11]Poser (1990) separates data whose N2s involve heavy syllables i.e. (43bii,iii), (43cii). In accordance with Poser's analysis, foot construction is sensitive to morae but not to syllables. N2s, i.e. udoN (43bii), karee (43biii) and oNna (43cii), are all trimoraic (in Poser's terms). I simply add such words listed above to other trimoraic examples in (43), without presenting as a separate set such words which are trimoraic and at the same time disyllabic.

b. Unaccented N2

i) me + ku su ri ---> me gu su ri

'eye' 'medicine' 'eyewash'

ii) ki tu ne + u do N ---> ki tu ne u do N

'fox' 'udon noodle' 'udon noodle with fried bean curd'

iii) ti ki N + ka re e ---> ti ki N ka re e

'chicken' 'curry' 'chicken curry'

c. Final-accented N2

i) i si + a ta ma ---> i si a ta ma

'stone' 'head' 'hardhead'

ii) yu ki + o N na ---> yu ki o N na

'snow' 'woman' 'snow fairy'

d. Penult-accented N2

i) sa to + ko ko ro ---> sa to go ko ro

'village' 'spirit' 'homesickness'

ii) de N ki + ka mi so ri ---> de N ki ka mi so ri

'electricity' 'razor' 'electric razor'

What Poser is proposing is a bimoraic left-headed foot which is built from the right edge, within the long N2. Also, taking into consideration the fact that the right-most foot is invisible, we can place the accent in the correct location.

(44)a. Compounds which retain the accent of N2

[ya ma [ho to to gi su]] ---> ya ma [ho to to gi su]

N2 has more than two feet (42c) applies

b. Final-accented long N2 (the same procedure for accentless long N2)

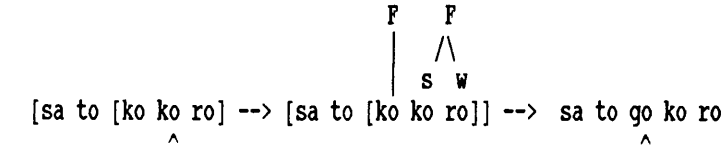
F F
| /\
S W

[i si [a ta ma]] --> [i si [a ta ma]] ---> i si a ta ma

N2 has two feet avoid the right-most foot, accent on the initial syllable of the visible foot (42b)

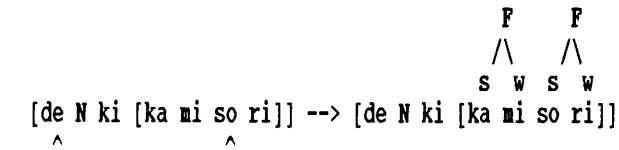
c. Penult-accented long N2

i) Tri-moraic N2



N2 has two feet — avoid the invisible foot, accent on the initial syllable of the visible portion (42b)

ii) N2 with more than three morae



N2 has two feet — right-most foot is invisible, accent on the initial syllable of the visible portion (42b)

---> de N ki ka mi so ri
^

Accent is assigned at the correct location, following (42).

2.4.2.2. Problems with Poser's foot structure

The proposal of foot structure shows greater explanatory adequacy than the morpheme boundary accent attraction theory. However, some facts remain unexplained. The first problem is to account for a compound whose N2 is penult accented and has two alternative pitch patterns, such as (36) above, which is repeated below.

(45)

N1		N2		PITCH PATTERN 1	PITCH PATTERN 2
na ma	+	ta ma go	--->	na ma ta ma go	na ma ta ma go
'raw'		'egg'		'fresh egg'	

The accent of N2 is on the penultimate mora, exactly like N2 in (44c). Thus, we would expect the compound to behave like those in (44c) and to have the pitch pattern 2 in (45). However, at the same

time, as in pitch pattern 1 (45), the compound retains the accent of N2. In other words, the compound also behaves like the class of compounds (44a), and the conditions (42) cannot account for this.

Another problem is that Poser's foot structure, outlined in 2.4.2.1, cannot predict the accent assignment in the compounds with short N2. The primary function of the foot is to determine whether if N2 is long or short; and if it is long, foot structure predicts the location of the accent in the compound. This is due to the fact that Poser limits the domain of foot construction to within the N2. As I noted in 2.4.1, many of the compounds with short N2 place the accent on the final syllable of N1; then, Poser's foot, which is built only within N2, cannot reach the syllable where the accent is located.

2.4.3. Antepenultimate-accent analysis of compound accent

2.4.3.1. Martin's proposal and deverbal nouns in compounds

Martin (1952) proposes that many Japanese compounds assign the accent on the antepenultimate mora regardless of the factors discussed above. Shibatani (1972) adopts a similar position, claiming that the accent of the compounds falls onto the antepenultimate mora, regardless of morphological interaction, because of the phonotactics of Japanese.

McCawley (1968) and Okuda (1971) argue against antepenult accent analyses, employing a set of exceptions, many of which contain a deverbal noun, to support this.

(46)

a. si ta + ha ta ra ki ---> si ta ba ta ra ki
^

'under' 'work' 'subordinate work'

b. hi to + tu ki a i ---> hi to du ki a i
^ ^

'person' 'association' 'sociability'

However, as Kubozono (1987) points out, taking Akinaga (1966)'s example, a compound which involves a deverbal noun as the final member tends to display irregular accent assignment in comparison to noun-noun compounds. Kubozono suggests that this is because the compounding process precedes the nominalisation of the verb, rather than to compound the deverbal nouns. Indeed, the accent assignment of a compound which involves a deverbal noun, as in (46), is an exceptional case, and it is difficult to find a noun-noun compound which behaves in this way. Poser (1990) uses the example of penultimate accented N2 kamisori, as in deNki+kamisori (44dii): the accent of the compound is located on the initial syllable of N2. However, this example should be categorised as a compound whose N2 is a deverbal noun. kamisori 'razor' is a compound noun: kami 'hair' + sori 'shaving', where sori is a deverbal noun from soru 'to shave'. I believe it necessary to investigate deverbal nouns separately, and in my analysis of compounds, I exclude compounds that involve deverbal nouns.

2.4.3.2. Antepenultimate accent suggested by Haraguchi (1991)

Haraguchi claims that the position of the accent in a long accented noun with four morae or longer, is normally predictable.

(47) Assign the accent to the antepenultimate mora of long nouns and noun equivalents of the [+accented] class.
(Haraguchi 1991: p.12)

The accent of longer nouns is determined by (47). They are simply lexically specified as [+accented],

in contrast to accentless words. Also, Haraguchi lists examples of categories that follow (47) above: namely, long loan words (48b) and long compounds (48c), along with nouns having four or more morae (48a). I simply take his representations, and mark the accent with ^ under the accented mora.

(48)a. u gu i su 'bush warbler'
^
L H L L

ho to to gi su 'mountain cuckoo'
^
L H H L L

b. bu ra u su 'blouse'
^
L H L L

hyu u ma ni zu mu 'humanism'
^
L H H H L L

c. ya ma ne ko - su to ra i ki 'wildcat strike'
^
L H H H H H H L L

i so p pu - mo no - ga ta ri 'Aesop's Fables'
^
L H H H H H H L L

Haraguchi suggests two possible parameter settings for antepenultimate stress (accent) assignment, although he has not decided which parameter is at work. Note that neither of them are applied to unaccented words (parameter setting [n/a/u] below).

(49) a. Line 0 parameter settings are [Ternary, left, right-to-left, n/a/u, -Exhaustive]

b. (i) Mark the final mora extrametrical.
(ii) Line 0 parameter settings are [Binary, left, right-to-left, n/a/u, -Exhaustive]

Both of the parameters above set an antepenultimate accent, as illustrated below in (50). (49a) is interpreted as follows. This is a parameter which has a ternary left-headed foot, built from the right edge of a word.

(50)
```
      *
    * *  * * *
    5 4 (3 2 1)
```

[-Exhaustive] specifies that the construction of the constituent structure is non-iterative. This parameter setting rules out (51a).

(51)* a.
```
      *     *
    * * *  * * *
   (6 5 4)(3 2 1)
```
[+Exhaustive]

b.
```
      *
    * * *  * * *
    6 5 4 (3 2 1)
```
[-Exhaustive]

Accordingly, the prominence is assigned to the antepenultimate mora. Turning to (49b), this parameter setting is illustrated as follows:

(52)
```
      *
  * * *(* *)<*>
  6 5 4 3 2  1
```

(i) of (49b) sets the mora 1 as extrametrical. (ii) shows that the binary left-headed foot assigns the prominence on the mora 3, the antepenultimate one.

Subsequently, Haraguchi's analysis is extended to the case of accent shift. The antepenultimate mora may coincide with a non-head portion of a rhyme.

(53)

Expected antepenult accent	Actual accent
a. e N so o - ka i ^	e N so o - ka i ^
b. da N - o N ^	da N - o N ^
c. pa s syo N ^	pa s syo N ^

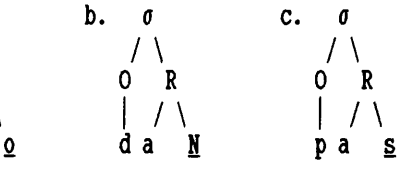
A principle is proposed:

(54) Move α

By (54), the accent shifts to the preceding mora: for the words in (53) the shift is rhyme internal i.e. the accent shifts from the complement to the head of the rhyme. It is only the head of the rhyme which can be accented, and not the complement. The second V of (C)VV in (53a), the nasal in (53b),

and the first geminate consonant of (53c), are rhymal complements.

(55) a. σ b. σ c. σ



[soo] [daN] [pas]

Haraguchi's 'move α' accounts for the rhyme internal accent shift: the complement of the rhyme cannot bear an accent, therefore the accent is shifted to the head of the rhyme. So far, the direction of the accent shift is predicted. However, the problem arises in predicting the accent shift due to High Vowel Devoicing (HVD). HVD means that a high vowel, i or u, becomes voiceless when flanked by two voiceless consonants, or when it appears word-finally, preceded by a voiceless consonant. The accent shifts one mora to the left, when the antepenultimate mora is subject to HVD. This HVD optionally causes the accent to shift, for example:

(56) ki to ku - ke N --- ki to ku - ke N
o o
^ ^

(Note: o under the high vowel shows that the vowel is devoiced)

This accent shift is formulated as follows:

(57) HVD: Assimilate α to ß.
Conditions: (a) α is [+high].
(b) ß is [C,-voice]___[C,-voice] or [C.-voice]___##.

The problem associated with this rule is that it fails to offer a reason as to why the accent has to shift to the left, rather than to the right. Moreover, no argument is presented to prove that the accent has actually 'shifted' rather than having been assigned to two different positions via two different derivations.

I fully agree with Haraguchi, in that one particular type of compound, consisting of nouns and loanwords with four morae or longer, assigns accent on the antepenultimate mora (nucleus, in my terms). However, I differ from Haraguchi with respect to my proposition concerning the role of a right-headed binary foot in Japanese accent assignment. In Chapters 3 and 4, I offer a detailed

explanation of how the antepenultimate nucleus is assigned an accent in only one class of compounds. At the same time, I show how the direction of the accent shift is determined, within the foot structure I propose (3.2.4.4). In addition, I specify which type of compounds undergoes antepenultimate accent assignment (3.2.6.2), and which type does not (4.2), and offer an explanation for this divergent behaviour.

Chapter 3

Phonological licensing and Pitch Accent Assignment

3.0. Introduction

In this chapter, I shall illustrate how a set of principles and parameters of phonological licensing derive the pitch patterns in Standard Japanese. My claim is that pitch accent phenomena in Standard Japanese are explained by the same principles as stress phenomena, and that the parameters characterise Standard Japanese as a pitch accent language. In the framework of Government Phonology, stress phemonomena are considered as manifestations of licensing relations between nuclear positions (Kaye 1990ab, Charette 1991). I assume that the licensing relation between nuclear positions is the driving force behind pitch accent behaviour in Standard Japanese.

This chapter is divided into three major sections. In the first section, after explaining why I employ a single pitch, high pitch, in Standard Japanese, I discuss how licensing between nuclear positions (see Chapter 1) is manifested in the assignment of pitch accent and high pitch. Subsequently, in the second section, based on my claim that pitch accent phenomena are the manifestation of licensing relations contracted between nuclei, I demonstrate that a nuclear position is a unit which can bear high pitch. Along with this issue, since the unit which bears pitch accent is subject to constraints, I discuss the conditions imposed on nuclear points which may bear a pitch accent.

First, I shall present data to illuminate the facts concerning pitch accent and high-pitch assignment in native Japanese (Yamato[1]) words. Then, I briefly point out the main problems, to which I shall offer solutions in this chapter.

---

[1]Yamato nouns are the words which are of Japanese origin, as opposed to loanwords or Sino-compounds.

3.1. Problems to be solved

3.1.1. Data of Yamato nouns

In the data below, which show the pitch patterns of Yamato nouns, I have presented words consisting of three OR (Onset-Rhyme) constituent pairs[2] because they are long enough[3] to effectively illustrate the general formulation of high-pitch assignment. Assignment of lexical accent is discussed in a subsequent section, however, for the present discussion I assume that location of the lexical accent is an arbitrary lexical property. Assuming that the position of the accent is an arbitrary lexical property, then, any one of the nuclei up to the n-th[4] nucleus can bear a lexical pitch accent. Also, a word may be lexically accentless. High pitched segments are overlined, and pitchless segments are left unmarked. I indicate the accent with an *, for lexical marking, on the lexically designated nucleus.

(1)

a. *	b. *	c. *	d.
na mi da	ta ma go	ta ka ra	ku ru ma
'tear'	'egg'	'treasure'	'car (wheel)'

---

cf.

*	*	*	
na mi da -ga	ta ma go -ga	ta ka ra -ga	ku ru ma -ga

(Note: -ga is the nominative Case-marker)

I also show the pitch patterns of the nouns when followed by the nominative marker, to illustrate the

---

[2]A word with three OR constituent pairs roughly corresponds to what in traditional terms is referred to as a trisyllabic word. See Chapter 1 for a detailed discussion on OR constituent pairs.

[3]Words which are longer than three OR pairs, and are without internal structure, i.e. morphology, are not frequent in the language. Also, if found, they have accents on the antepenultimate nuclei (3.2.4.4). In other words if the word is 'long' (four OR pairs or longer), the location of the accent is predictable, unlike the 'short' (1-3 OR pairs) nouns treated in this section.

[4]In this case, up to the third nucleus, for reasons discussed in footnote 3.

difference between (1c) and (1d), both of which have the same pitch patterns in isolation. The accentual patterns of nouns consisting of three OR pairs are divided into four groups, as shown in (1) above. In (1a), only the initial nucleus is high-pitched, and the remaining nuclei are pitchless. In (1b), only the second nucleus is high-pitched, while the initial and the final nuclei are pitchless. (1c) has two adjacent high-pitched nuclei, and only the initial nucleus is pitchless. The accentless noun in (1d) and final accented noun in (1c) have identical pitch-patterns when in isolation.

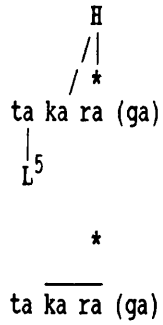
3.1.2. The aim

My aim is to offer solutions to the problems which previous works on pitch accent could not explain, and to give a principled account of what has been treated arbitrarily in the past. Most of the problems stem from the fact that the aim of previous works has been merely to assign tones to yield the correct pitch patterns of nouns belonging to various accentual classes as above in (1). Although the proposed rules or principles, which I described in detail in Chapter 2, assign correct pitch patterns, there are three major problems to be solved.

The first problem concerns the existence of two tones: a high tone (H tone) and a default tone, low tone (L tone). As I explained in detail in chapter 2, past works on pitch accent classify the phonetic realisation of a H tone, i.e. the immediate interpretation of a pitch accent, as being a rise in pitch. However, a L tone has been employed as a default tone: yet the existence of a L tone was never supported by any evidence. I shall show that what has been believed to be a default tone, is in fact a mere absence of tone (pitch).

The second problem concerns the reason why the lexically accented vowel and (some of) the vowels occurring to its left share H tone. The standard analyses such as in Haraguchi (1977) and Poser (1984), employ a rule to spread the tone. For example, in the system of Poser (1984), the H tone, which originates from the lexical accent, spreads to the left (2).

(2)



I claim that as a whole, the high pitch assigned to the accented nucleus and the licensed nuclei to the left (except for the domain-initial nucleus) is the interpretation of the pitch accent, based on the fact that the pitch pattern of the whole grammatical category in Standard Japanese is predictable, once the accent location of the domain is known as observed in Chapters 3 (morphologically simplex nouns), 4 (compound nouns and Phrases) and 5 (sentences). In other words, high tone assignment does not involve any structural operation i.e. to assign an element H (high tone) and to spread the tone, but the high pitch realisation is the interpretation of a pitch accent (see 3.2.4.2 for detailed discussion).

The third problem is that the set of rules (Poser 1984) (or principles (Haraguchi 1988, 1991)) are not treated as one unified process, and thus in themselves they do not demonstrate any natural course of a phonological event. For example, I stated in Chapter 2 that Haraguchi (1991) employed the metrical grid to discuss accent location in a word, and a set of principles and parameters to map tones to the correct vowels. I agree with the claim made by Haraguchi (1991) that accent location in certain classes of words is predictable, and accordingly Standard Japanese should be regarded as any other stress system: to wit, the stress (accent) location is predictable, if it is not specified lexically. However, my analysis differs from Haraguchi, who employs a metrical grid, in that I assume licensing relations between nuclei, which predict the default location of pitch accent. Further, my analysis predicts the landing site of an accent, when the default location is not available for bearing accent, which is not possible in Haraguchi's metrical analysis (see also

[5]I should note that Poser postulates a rule to insert L tone on the initial vowel (unless the vowel is lexically accented), and the purpose of the rule is to prevent H-tone from spreading to the initial vowel.

Chapter 2). At the same time, my analysis predicts some phenomena related to lexical accent assignment i.e. historical change of lexical accent location (3.2.5).

I emphasize that the analysis I present in this chapter is devoted to an account of various pitch accent phenomena without resorting to additional rules to describe each of the phonological events separately, and that the aim is not merely to map the correct pitch patterns of the data.

3.2. Proposal

3.2.1. Licensing Principle

I propose that all pitch accent phenomena I deal with in this thesis are subject to the Licensing Principle (Kaye 1990a):

(3) **Licensing Principle**
All phonological positions save one must be licensed within a domain. The unlicensed position is the head of the domain.

In Government Phonology, all phonological positions, except for one, the head of the domain, must be licensed. Non-nuclear heads are licensed by nuclei, and non-nuclear complements are licensed under government by onset heads (Chapter 1). At this level, 0 projection level, where all the skeletal positions are present, nuclear heads are not yet licensed except by inter-constituent government for nuclear sequences. Nuclear heads are projected to nuclear projections, where the licensing of nuclear heads operates. Following the proposal by Kaye (1990b), in accordance with which metrical and harmony processes are the manifestation of licensing at the nuclear projection, I claim that high-pitch assignment in Japanese is of this type.

The Licensing Principle, with two other Principles I propose in the following section, predicts pitch accent assignment if not lexically marked, and high-pitch assignment location in a word. And in subsequent chapters I demonstrate that in all types of domains, a morphologically simplex word, a compound word, and also a phrase, the same principles are at work.

3.2.2. Pitch Accent Principle

Along with the Licensing Principle, I propose that two other Principles are at work to derive pitch accent phenomena. The first of these is the Pitch Accent Principle (4):

(4) Pitch Accent Principle

A pitch accent language has only one pitch, high pitch, which is the immediate interpretation of a pitch accent.

First, I shall discuss my reasons for claiming that a pitch accent language has only one pitch, the high pitch, focusing on Standard Japanese. Subsequently, referring to a small set of Serbo-Croatian data, I discuss why I label the statement (4) the Pitch Accent Principle, rather than treat it as a language specific matter for Standard Japanese. A (lexical) accent is interpreted as a high pitch, thus an accented vowel is high-pitched. For example, let us refer to the data (1a,b), which I repeat in (5). (1a) has its accent on the initial nucleus, and (1b) has its accent on the second nucleus. The accented nuclei are high pitched (5).

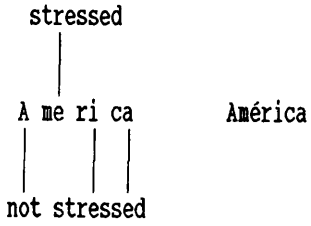
(5) a. n a m i d a (*) 'tear'

b. t a m a g o (*) 'egg'

In Japanese, as in any stress language, where one marked nucleus has prominence and the others do not, the lexically marked nucleus is high-pitched, whereas other nuclei are not. Let us consider the following stress pattern as an illustration. In the English word América, stress is assigned on the antepenultimate nucleus, and other nuclei are not stressed[6]:

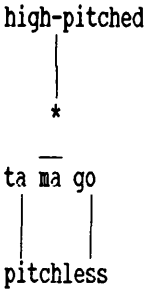
[6]One might wonder what happens to secondary stress. However, I only discuss primary stress, and I treat all the other nuclei as having a lesser degree of stress.

(6)



In the same manner, in Standard Japanese, the accented nucleus is high-pitched and the other nuclei are simply not high-pitched, that is, pitchless. In other words, nuclei without high-pitch do not have to carry another pitch, and indeed, they are pitchless.

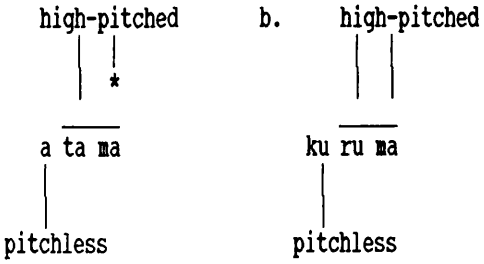
(7)



Vowels which are not high-pitched have been said to bear a low tone (Haraguchi 1977, 1991, Poser 1986, Matsumori 1989). There is, however, no evidence for the existence of another tone/pitch. To call what is not H-toned "low-toned" is unwarranted: such vowels are merely pitchless (see also Chapter 2 for more detailed discussion on the status of L tone).

Turning to forms such as (1c,d), we see that there is more than one high-pitched nucleus in each, while in (1a,b), only one nucleus is high-pitched. I have explained that the high pitch is the interpretation of a pitch accent. The reason the neighbouring nuclei are high-pitched, is also an interpretation of a pitch accent (8): the interpretation of pitch accent is discussed in detail in a subsequent section. Nuclei which do not share the high pitch are pitchless.

(8)a. b.



As a result of high-pitch interpretation, we find, so to speak, one block of high-pitched segments which are not separated by any pitchless segments.

One might object that (8b) cannot be explained, because the noun does not have any lexical marking, and yet is assigned a high pitch. This appears to contradict my claim that a high pitch originates from a pitch accent. I shall show that an accentless domain must have a high pitch, as we see in (8b).

The Pitch Accent Principle and the Licensing Principle predict that in a pitch accent language, a word (domain) should always have one and only one block of high-pitched nuclei. In accordance with the Licensing Principle, a domain has to have a head. In a pitch accent language, the (lexically) accented (high-pitched) nucleus is the head of the domain, and the high pitch may be shared by the neighbouring nuclei. The fact that a domain has to have a high pitch can be derived from the Licensing Principle. For example, in Standard Japanese, there is no well-formed phonological string, without a high-pitched nucleus; at least one nucleus has to be high-pitched. The lexically accented nucleus is the head of the lexically marked domain (word). In an accentless domain, that is, when the domain does not have lexical marking, there has to be a head, which is high-pitched. For a word like kuruma above, it is the domain-final nucleus which becomes the head if there is no lexical marking in the domain and if the word consists of three or less OR pairs (see 3.2.4.4 for the reason why the head should be the domain-final nucleus for the type of word in question). The head of the domain is interpreted as high-pitched (and the pitch may be shared by neighbouring nuclei (see 3.2.4.2)).

I now show why I propose the Pitch Accent Principle as a general principle rather than as a language specific matter peculiar to Standard Japanese. The Licensing Principle and the Pitch Accent Principle predict that a pitch accent language should not allow a domain such as (9):

(9) * $\overline{\text{C V C V}}\ \text{C V}\ \overline{\text{C V C V}}$

In one domain, there is only one head, and the head has to be high-pitched. Its pitch value may be shared by the neigbouring nuclei. Thus a domain should not have more than one high-pitched block as

in (9).

To illustrate this idea, I refer to the data in (1). We see that the predictions of the Principles are correct for Standard Japanese, since the language does not allow more than one high-pitched block of segments in one phonological string.

One might wonder whether it is a L tone or pitch, rather than a H pitch, which is present lexically, and therefore assigned to the head of the domain in Standard Japanese. At this point, the question as to why a L pitch cannot be the only pitch (instead of a H pitch) is answered as follows. Let us assume that a L pitch were to exist instead of a H pitch in a pitch accent language. A L pitch may originate from, or may be assigned to, the head nucleus of the domain. For convenience, below in (10), non-high nuclear segments are associated to L (for 'low'), however the representation below does not correspond to any aspect of my analysis presented in this thesis.

(10)a. b. c. d.

Recall the Licensing Principle, which says that a domain can have only one head. We, then, should not expect more than one head in one domain to associate to a L pitch, which may be shared by the neighbouring nuclei. Consequently, no more than one block of L-pitched segments is expected in a domain. However, as the form in (11b) demonstrates, a word may indeed contain more than one L-pitched block of segments. Thus, the assumption that a L pitch is the existing pitch is not compatible with the Pitch Accent Principle.

In other pitch accent languages, it is also true that a domain does not contain more than one high-pitched block. For example, in Serbo-Croatian (Štokavian dialect)[7], there are no words (domains) with more than one high pitched block[8,9].

---

[7]The data are from Inkelas and Zec (1988). In addition, I consulted three native speakers of the dialect. I also had a chance to consult a Čakavian dialect speaker, and what I observed was that the Čakavian dialect does not share a high pitch. Only the head of the domain is high-pitched.

[8]I only indicate high-pitched segments, unlike the representation by Inkelas and Zec (1988), who employ a bar over high-pitched segments and a bar below 'L-toned' (in their terms) segments.

(11)a. **NOUNS**

i. z a a s t a v a 'flag'

ii. j e z e r o 'lake'

iii. r a a z l i k a 'difference'

iv. p a p r i k a 'pepper'

b. **COMPOUND NOUNS**[10]

i. k u č e p a z i t e l j 'apartment manager

(kuč 'apartment' + pazitelj 'manager')

ii. p l a a v o z e l e n 'blue-green'

(plaav 'blue' + zelen 'green')

This is just one representative example; as far as I know, other pitch accent languages, such as Basque (consult the data in Hualde 1991) conform to the predictions of the two principles.

There is another Principle to propose, which is the Lexical Marking Principle, which I discuss in the subsequent section.

---

[9]Inkelas and Zec (1988), who assumed a Low tone as the default tone, claim the following. Because the lexical tonal facts in Serbo-Croatian can be accounted for without referring to Low tones, by making Default Low Insertion (Pulleyblank 1986) a post-lexical rule, in other words excluding Low tones from the lexicon, one can prevent L tone interfering with the H tone application rules operating at the lexical level. They apply Low tones post-lexically, to whichever segments are left toneless at the lexical level. This is why they claim that they do not make use of a three-way contrast, i.e. High vs. Low vs. 0 at any stage of derivation. I, however, think that we can avoid the three-way contrast of High-0-Low, only by excluding Low tones from all stages of derivation. There is no evidence that so-called low tone has any phonological relevance.

[10]I only focus on the distribution of high-pitched segments in the compounds: there is only one high-pitched block in the external domain of a compound structure. Two domains are compounded [[A][B]], only one accent is projected to the external domain AB, since in one domain, not more than one head (accented nucleus) is allowed (see 4.1 for the discussion of morphology).

3.2.3. The status of lexical marking

In 3.2.2, I have explained that the source of high pitch is the interpretation of the pitch accent. In this section, I demonstrate that the lexically marked nucleus of a domain is the inherent licenser of the domain.

My proposal is that the formalism of pitch accent phenomena in Standard Japanese is identical to that of stress phenomena: both are subject to the Licensing Principle, according to which a domain can have at most one head. In a stress system, the stressed (primary stress) nucleus is the head of the domain, and the other nuclei in the domain are licensed by the nucleus. In a pitch accent system, the accented nucleus is the licenser of a domain, and the remaining nuclei in the domain are licensed by the head.

I have mentioned that in Japanese, the location of accent assignment is predictable (detailed analysis on accent assignment is in 3.2.5), otherwise the accent location is lexically determined. In stress languages also, if the stress location is not predictable, it is specified in the lexicon. Accordingly, I propose the following:

(12) **Lexical Marking Principle**

> A lexically marked nucleus, i.e. a nuclear position which is stressed/accented lexically, is the inherent licenser of a domain, and thus cannot be a licensed member in its own domain.

To illustrate, I take examples of English words, whose stress location is not predictable, and therefore is specified in the lexicon. In English, main stress is regularly assigned to the penultimate rhyme if it is branching, or else to the antepenultimate, if the penultimate rhyme does not branch (Halle and Vergnaud 1989).

(13)

a. Stress on penultimate		b. Stress on antepenultimate
i.Branching Nucleus	ii.Branching Rhyme	
aróma	agénda	América
balaláika	amálgam	cínema
angína	phlogíston	ásterisk

However, there are some nouns in English that have main stress on the penult even though they do not belong to the class listed in (13a).

(14)

cerebéllum	medúlla	Kentúcky	Mississíppi

As Halle and Vergnaud (1989) point out, the stress location of the words in (14) is lexical. These words have lexical stress on the penultimate phonetically interpreted nucleus. Recall the Lexical Marking principle. The marked nucleus is the head of the domain designated lexically, which licenses the remaining nuclei in the domain/word. The inherent licenser, the lexically marked nucleus, cannot be licensed by another nucleus.

Similarly, in Standard Japanese, if the accent location is specified in the lexicon, the designated nucleus is the head of the domain, which licenses the remaining nuclei in the domain.

Note, however, that there is a significant difference between stress and pitch accent: pitch accent is interpreted as a high pitch which may be shared by the neighbouring nuclei; on the other hand, prominence due to stress cannot be shared in the same sense. In a stress system, the head of the domain is the stressed nucleus, and the licensed positions (other nuclear positions in the domain) have a lesser degree of prominence. In short, a stress system is polar: the head is stressed and others are not.

Constraints on lexical accent assignment are discussed after I show the general formalism of pitch accent assignment in Standard Japanese. There, for the first time, the fact becomes clear that the lexical marking process is not entirely arbitrary as was believed to be (see Chapter 2 and 3.1.1), and that the lexical accent assignment respects the algorithm of accent assignment.

3.2.4. Formalism of pitch accent assignment

- Words without lexical marking -

In this section, I demonstrate how an accent is assigned to a word without lexical marking. The accent assignment is an instance of the binary licensing relation contracted between nuclei at nuclear projections, as in stress assignment. I demonstrate how a pitch accent language like Standard Japanese can theoretically be regarded as a stress language.

3.2.4.1. Problem

The standard assumption was to divide words in Standard Japanese into two classes according to whether they are lexically accented or not. In other words, all the accented words were believed to be accented on the lexically designated vowels. To illustrate, I repeat the data in (1), which has four classes of words, in (15) below. To highlight the fact that the words belonging to classes c and d in (15), are different, I add the nominative marker -ga to show the contrast in tone pattern with the suffix.

(15)

a.	b.	c.	d.
*	*	*	
na mi da (-ga)	ta ma go (-ga)	ta ka ra (-ga)	ku ru ma (-ga)
'tear'	'egg'	'treasure'	'car (wheel)'

Haraguchi (1991) shed light on certain words among those that were believed to be lexically accented. He has shown that they actually have accents in a predictable position, and that their accents are assigned in the derivation (see also Chapter 2 for a more detailed account by Haraguchi). His argument is based on the data shown below:

(16)

a. u gu i su 'bush warbler'
^

b. mu ra sa ki 'purple'
^

Note: ^ under a vowel denotes an assigned accent as opposed to a lexical one marked by *.

These words were believed to have lexical marking on the antepenultimate nucleus. The contribution made by Haraguchi was to claim that a pitch accent in Standard Japanese is like stress, in that the location of the accent is predictable, or else it is lexical. Accordingly, Haraguchi (1991) divided words into three categories: 1) lexically accented on the specified nucleus, 2) (lexically) specified as accented but its location is to be decided in the derivation, and 3) lexically accentless (Haraguchi 1991). My claim conflates groups 2) and 3) above into a lexically accentless class: there is no need to distinguish these words according to whether they are lexically specified as accented or not. The classification 'lexically accentless' is sufficient, since there is a reason why certain words are assigned a pitch accent and others are not.

3.2.4.2. Licensing at nuclear projections

In this section, I shall discuss how licensing between nuclear heads is expressed in accent assignment in Standard Japanese. To illustrate how an accent is assigned to a given domain, I set three parameters for licensing at nuclear projections, in Standard Japanese.

(17) **Licensing of Nuclear Heads**

Parameters for Standard Japanese

a. The direction of licensing between nuclear heads is head-final at nuclear projection 1 level. In metrical terms, feet[11] are right-headed in Standard Japanese.

b. The interpretation of pitch accent is that the accented nucleus (the head of the domain) and the nuclei to the left are all high-pitched.

c. Domain-initial nuclei are inaccessible, and thus are not subject to high-pitch sharing.

To begin, I shall explain the parameter a, to discuss how the licensing relation between nuclei manifests itself in the accent assignment of a word. To consider how an accent is assigned, let me refer to simplex Yamato words whose accent location is not specified lexically, and consisting of 4 OR pairs or more (since a shorter ones behave in a different way as I discuss subsequently). The words in question are rare, but, it is not impossible to find some examples as provided below, with their pitch patterns:

(18)

a. *
mu ra sa ki 'violet (colour)'

b. *
u gu i su 'bush warbler'

c. *
ho to to gi su 'cuckoo'

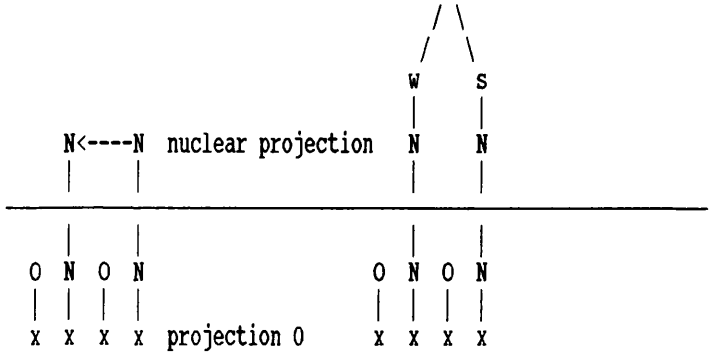
Accent is assigned on the antepenultimate nucleus to the words in (18).

The process of accent assignment is as follows. As the representation below in (19) illustrates, my proposal is that pitch accent phenomena in Standard Japanese are the manifestation

[11]As I have discussed in Chapter 1, I employ the term foot (feet) to refer to the binary licensing relation between two nuclei at the nuclear projection 1, and not as a constituent.

of a head-final binary governing relation. In metrical terms, this applies in right-headed binary feet: within a binary foot, the strong member (marked with s), the head position, governs the weak member (marked with w):

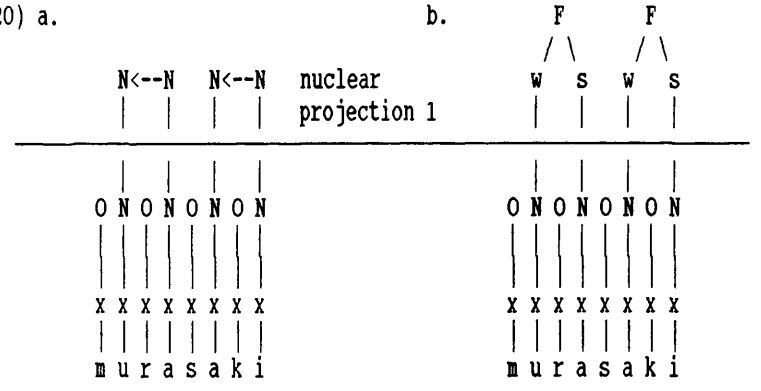
(19)a.



b. Note: F stands for foot

Recall the Licensing Principle (Kaye 1990a): all the nuclear positions must be licensed by the head of the domain. Assuming the domain of pitch accent assignment to be a word, all the nuclear positions within a word must be licensed by the head nucleus. At the first nuclear projection, binary head-final governing relations are contracted, as illustrated in (19a). (20) shows how I translate licensing relations at the nuclear projection 1 (20a), into foot structure (20b). For example, murasaki 'violet' is assigned an accent as follows:

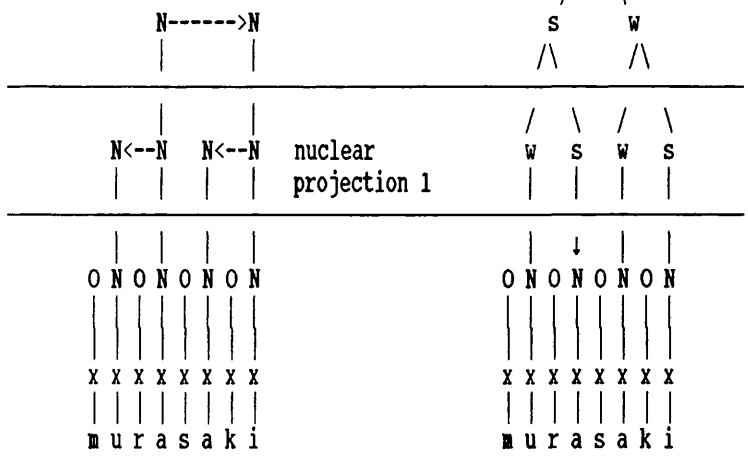
(20) a.



b.

The unlicensed nuclei, the head nuclei of the feet are projected to the higher nuclear projection. At the nuclear projection 2, the licensing relation is head-initial: the head nucleus of the penultimate foot is the head of the domain, and thus is accented. Note that WT denotes a word tree.

(21) a.

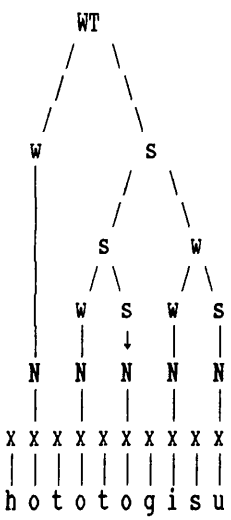


b.

*
mu ra sa ki

At a higher nuclear projection level, above the third nuclear projection, the licensing relation is head-final: the head of the penultimate foot is the head of the domain, and thus is accented. Note that other feet to the left are incorporated as weak members of the word tree. Let us take a longer word which contains more than two feet, hototogisu 'mountain cuckoo'.

(22)



*
ho to to gi su

Now the accent is assigned. To consider how the pitch patterns in (18) are recognised, I shall

explain the parameter in (17b). A stress system is polar: the head nucleus of the domain is stressed and other nuclei are not. Consider a system which is non-polar: in other words, instead of just the head having a particular property, the head and some of its licensees share that property, e.g. high pitch. This non-polar system is exactly the case in high-pitch interpretation in Standard Japanese. In fact, in any given phonological string in Standard Japanese, if the location of the head nucleus is determined (lexically or in derivation (see also Chapters 4 and 5)), the location of the high-pitched portion is predictable in the string in question: from the head nucleus to the left, up to the domain-initial nucleus (which is inaccessible to high-pitch asssignment (3.2.4.3)), all the nuclei are high-pitched. Thus, it is because of the interpretation of the pitch accent that the segments are high-pitched and not because of the structural operation i.e. there is no structural element such as high tone to be assigned to the head nucleus. High-pitch is a mere interpretation of a pitch accent. Thus the pitch patterns of the words above are realised as follows:

(23)a. b.

```
      *          *
mu ra sa ki   ho to to gi su
```

Accent is interpreted as high pitch. The accented nucleus and nuclei to the left excluding the domain-initial one are high-pitched.

```
      *          *
     ___        ____
mu ra sa ki   ho to to gi su
```

In this manner, the accent is assigned to the word and accordingly high pitch is interpreted in the words consisting of four or more OR pairs. Readers should refer to 5.1.2.1 for further discussion on the interpretation of the head nucleus in Standard Japanese.

So far, parameters (17a&b) have been discussed. Another parameter to be explained is that relating to the inaccessibility of the domain-initial nucleus to high-pitch sharing. I support this solution for the following two reasons. The first reason is based on the data within Standard Japanese, and the second reason comes from the analysis of data from other languages, which suggest

that Standard Japanese is not idiosyncratic in its special treatment of the domain-initial nucleus. I shall discuss the data within Standard Japanese first.

As I mentioned earlier (3.1.1), a noun (or any phonological string) in Standard Japanese always has a pitchless initial nucleus, unless the nucleus itself is accented. For convenience, I repeat the data from (1) in (24).

(24)

a. *	b. *	c. *	d.
na mi da	ta ma go	ta ka ra	ku ru ma
'tear'	'egg'	'treasure'	'car (wheel)'

It is also true in all the forms given in (18) that they all have pitchless initial nuclei.

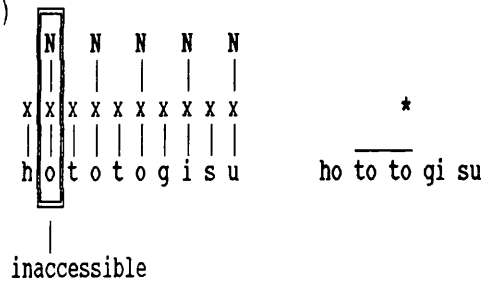
Besides the data above, my claim is also supported by the discussion on phrasal tone patterns in Chapter 5. Readers should refer to the relevant section in Chapter 5, 5.1.2.2, where I discuss in detail why the parameter controlling the inaccessibility of the domain-initial nucleus is necessary. Briefly, however, the noun-initial nucleus is not affected by high-pitch interpretation in citation form; however the nucleus becomes accessible when the noun is preceded by another word, i.e. when the noun-initial nucleus is not domain-initial, but preceded by other nuclei. Accordingly, I propose a parameter as in (17c) which is repeated below for convenience (25):

(25)

Domain-initial nuclei are inaccessible, and thus are not subject to high-pitch sharing.

Thus, a high-pitch is not assigned to the initial nucleus of the noun, when in isolation (26).

(26)



Now the question arises as to whether this inaccessibility results from the lack of a licensing relation. Since I discuss this matter in detail in Chapter 4, I only note the following briefly: this inaccessibility does not mean the absence of a licensing relation involving the domain-initial nuclear position. All the nuclei must be licensed by the head nucleus (Licensing Principle, Kaye 1990a): the initial nucleus of a noun also has to be involved in a licensing relation. However, in post-pausal position, the nucleus is inaccessible to high-pitch sharing, perhaps to indicate the domain or word boundary. It is merely that the domain-initial nucleus cannot be affected by the high-pitch interpretation of the head nucleus, being inaccessible.

In fact, this inaccessibility of the peripheral nucleus[12] is not an idiosyncratic phenomenon of Standard Japanese. To show that this inaccessibility of the initial nucleus is not peculiar to Standard Japanese, I give examples from other languages, namely, Parisian French (Charette 1988, 1991) and Tonkawa (Y.Yoshida 1990).

3.2.4.3. The Inaccessibility of Initial Nuclei

In this section, I give some examples from Parisian French (Charette 1988, 1991) and Tonkawa (Y.Yoshida 1990) which demonstrate the inaccessibility of initial nuclei.

According to Government Phonology, the vowel-zero alternation observed in French and Tonkawa results from the non-interpretation of a nucleus. Non-interpretation of an empty nuclear position occurs when the nucleus is p-licensed (Kaye 1990a,b, 1992, Charette 1991)(see also 1.1.2). When an empty nucleus is properly governed[13] by the following nucleus, it is inaudible. However, if the nucleus is not properly governed, it is audible. I cite the relevant part of the definition of proper government (Kaye 1992) as follows (27a), and include a representation (27b) to illustrate the definition:

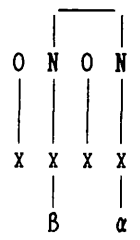
---

[12]Depending on the language in question, the inaccessible peripheral nucleus can be domain initial or domain final. For example, J. Kaye (personal communication) has pointed out to me that in Kazakh, domain final nuclei appear to be inaccessible to vowel harmony.

[13]Note that phonological government is one form of licensing. The reader should refer to Chapter 1 for the definition of government. The term phonological government refers only to the following three relations: constituent government, inter-constituent government and proper government.

(27)a. A nucleus α properly governs ß iff
i) α governs ß
ii) α is not itself licensed.

b. Proper Government



ß is not interpreted,
and is inaudible

The exact quality of the vowel which alternates with zero varies according to language-specific parameter settings.

First, I discuss the case of French. In French, when an empty nuclear position is properly governed by the following nucleus, it is inaudible; whereas, when the empty nucleus is not properly governed, the nucleus is interpreted as schwa (or ϵ, when stressed). In contrast to Quebec French, Parisian French keeps the initial nucleus inaccessible to proper government (Charette 1988, 1991).

(28) a. mener 'to lead' [məne]

b. amener 'to lead' [amne]

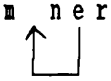
(Parisian French)

(28a) shows that in Parisian French, the initial nucleus is pronounced as schwa. When the empty nucleus occurs in domain-initial nuclear position, which is inaccessible in Parisian French, it cannot be properly governed (29a). The empty nucleus is realised as schwa. On the other hand, in amener (28b), the empty nucleus does not occur in domain-initial nuclear position, but is preceded by another nuclear position (dominating [a]).

(29) a. m ɔ n e r

[mɔne]

b. a m n e r



p-license

[amne]

Therefore the empty nucleus is now accessible to proper government, and is properly governed by the following nucleus: the empty nuclear position remains uninterpreted.

A second example of the inaccessibility of domain-initial nuclei is found in Tonkawa, formerly spoken in Texas. Tonkawa keeps the initial nucleus inaccessible to proper government (Y.Yoshida 1990). However, proper government has to be slightly modified to account for the vowel-zero alternation in this system. As defined above, e.g. in French, proper government applies to empty nuclear positions, which manifest vowel-zero alternation under appropriate conditions. But Tonkawa manifests proper government which is extended to apply a vowel-zero alternation to all vowels in the language. In Tonkawa, as the four sets of examples listed in (29) show, each of the four vowels /i,o,e,a/ is subject to vowel-zero alternation. Any one of these vowels which is dominated by a properly governed nuclear position, is subject to non-interpretation. However, the initial nucleus of a given phonological string is never subject to vowel-zero alternation, and therefore, we must assume it is inaccessible to proper government.

(30) a. picno? 'he cuts it'
wepceno? 'he cuts them'
kepceno? 'he cuts me'
picen 'steer'

b. notxo? 'he hoes it'
wentoxo? 'he hoes them'
kentoxo? 'he hoes me'
notox 'hoe'

c. netlo? 'he licks it'
wentalo? 'he licks them'
kentalo? 'he licks me'

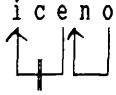
d. naxco? 'he makes it a fire'
wenxaco? 'he makes them a fire'
kenxaco? 'he makes me a fire'

NB: prefixes
ϕ- (unmarked)
Object 3rd sg.
we- Object 3rd pl.
ke- Object 1st sg.

suffix
-o? Subject 3rd sg.

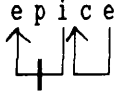
For example, the verb stem portion is pronounced as picn 'cut' in picno? whereas the stem portion is pcen 'cut' in wepceno?. Referring to the nominal form picen 'steer', we see that without proper government operating in the domain, the two vowels of the stem portion, i and e are pronounced. There is no proper government between nuclei in the form since: i) the initial nucleus dominating i is inaccessible, and ii) the nuclear position dominating e is not followed by a potential proper governor, i.e. an audible nucleus[14]. In picno? the second nucleus of the stem is not interpreted, being properly governed by the following nucleus. In wepceno?, the initial nucleus of the phonological string is inaccessible, leaving the second nuclear position as the target for proper government. Since the following nucleus is a potential proper governor (e), the second nucleus is not interpreted. Scanning of a phonological domain is from left to right (Y.Yoshida 1990): if the scanning were from right to left, in wepceno? in (30b), the third nuclear position dominating e would be subject to non-interpretation, being followed by an audible nucleus dominating o, a potential proper governor.

(31) a. p i c e n o ?



[picno?]

b. w e p i c e n o ?



[wepceno?]

(31ab) show that the proper governing relation indicated by 1 fails to apply because the initial nucleus is inaccessible. Consequently, in the proper governing relation indicated by 2, the third nucleus, which is unlicensed, properly governs the second nucleus. The same procedure applies to all the other data. The initial nucleus of the string, which is ungovernable, turns out to be governable following the addition of a prefix whose nucleus takes over the role of the domain-initial nucleus.

To conclude, inaccessibility of domain initial nuclei can be observed in at least two other languages, and therefore it is not an idiosyncratic characteristic of Standard Japanese.

[14]In Tonkawa, a domain-final empty nucleus has the property of being parametrically licensed. See Chapter 1 for a detailed discussion of licensing of a domain-final empty nucleus.

3.2.4.4. Accentless nouns

So far, the general formulation of metrical structure and the interpretation of the licenser head have been discussed. As I have noted earlier, the type of nouns which are assigned an accent on the antepenultimate nucleus and the type of nouns without an accent belong to the same lexically unaccented category. Here I shall demonstrate how they are categorised into a single class of words, lexically unaccented.

The difference between the words which are assigned accent on the antepenultimate nucleus and the ones without any accent, is in the size of the word: the former consists of four or more OR pairs, whereas the latter three or less. Note that in (32) the nominative marker -ga is added to the noun to show that the accentless words are indeed accentless, and not finally accented (no high pitch appears to the right of the accent (3.2.4.2)):

(32) a. Antepenult accent

*

mu ra sa ki (ga) 'violet'

*

u gu i su (ga) 'bush warbler'

*

ho to to gi su (ga) 'mountain cuckoo'

b. Accentless

ha na (ga) 'nose (nom.)'

a me (ga) 'candy (nom.)'

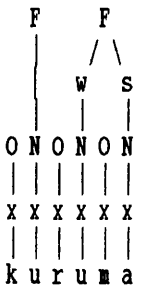
ku ru ma (ga) 'car (nom.)'

i wa si (ga) 'sardine (nom.)'

I demonstrate how the size of the words is relevant to the issue at hand. The accent location in a phonological string which has no lexical marking is the head of the penultimate foot (3.2.4.3). Consider foot construction in shorter words above in (32b). Right-headed feet are constructed from the right-edge of the word:

(33) a.

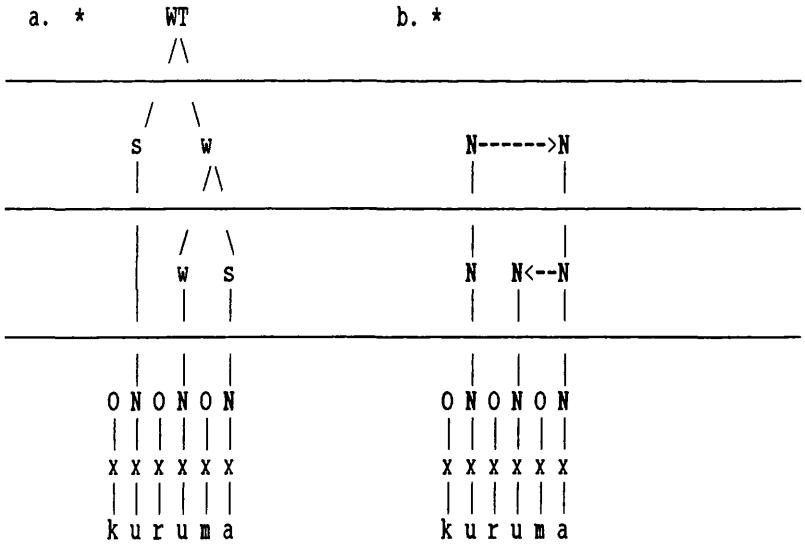
b.



In a word consisting of two OR pairs, only one foot is constructed. Thus an accent cannot be assigned since there is no penultimate foot to be accented. Then the head nucleus of the branching foot becomes the head of the domain which receives the high-pitch interpretation, yielding the pitch pattern ∅H where ∅ represents pitchless and H denotes a high-pitched nucleus.

In words consisting of three OR pairs, the penultimate foot becomes a non-branching, degenerate foot. Degenerate feet consist of an unlicensed nucleus. This nuclear position has no other nuclear position to license within the foot, unlike the head position of a branching foot. Thus the nuclear position within a degenerate foot cannot become the head licenser of the word domain: the nucleus of the degenerate foot cannot be the licenser of the head nucleus of other feet, because the nucleus in question is not a licenser at the nuclear projection.

(34) a. *

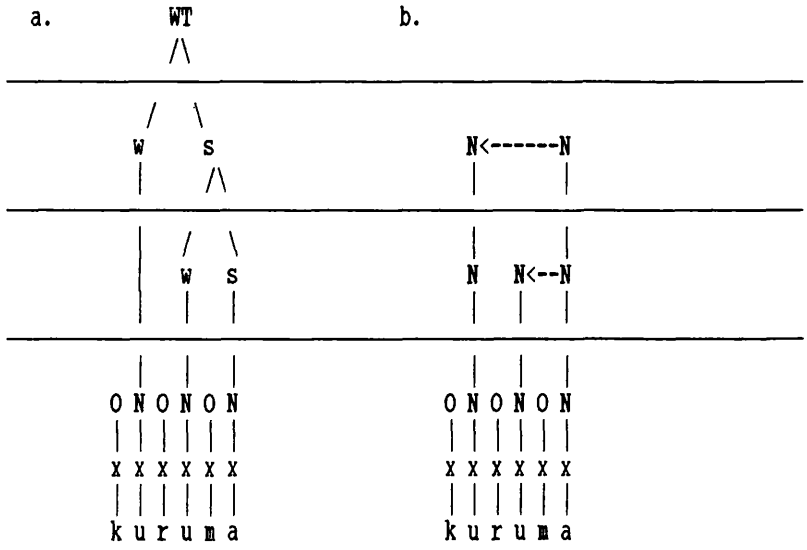


b. *

Thus an accent cannot be assigned to such a word, and the head of the branching foot becomes the head

nucleus, which receives the high-pitch interpretation.

(35) a. b.



The head nucleus and the nuclei to the left excluding the domain-initial one are high-pitched.

This section discusses how the size of a lexically accentless word determines the output as either an antepenult-accent word or an accentless word.

3.2.5. Lexical Marking Assignment

I have shown the basic algorithm of accent assignment. This section discusses lexical marking assignment, which provides the evidence to support the hypothesis that the formalism of pitch accent assignment is identical to that of stress. The lexical accent was believed to be a completely arbitrary lexical property of a word (Poser 1984, Haraguchi 1977,1991). However, I claim that the statistical study of lexically marked words proves that lexical accent assignment respects the algorithm which I demonstrate in 3.2.4.

In theory, a lexical accent may land on any nucleus in the word, and indeed, as I listed in (1) (3.2.4.1), there are n possibilities of locating a lexical accent, where n stands for the number of OR pairs the word contains. This is absolutely true for words containing two OR pairs. However,

as for words consisting of three OR pairs, I would like to emphasize that the proportion of the number of words found for possible accent location is uneven. According to the list of pitch-patterns by Hirayama (1957), which lists nearly all morphologically simplex Yamato words, the following distribution of words is found:

(36)a. 2 OR pairs

Location	Number	Examples
Initial N	49	* hasi 'chop sticks'
Final N	59	* hasi 'bridge'
Accentless	50	hasi 'edge'
Total: 158 words		

b. 3 OR pairs

Location	Number	Examples
Initial N	24	* zakuro 'grenadine'
Medial N	1	* kokoro 'heart'
Final N	26	* warabi 'bracken'
Accentless	62	kasumi 'haze'
Total: 113 words		

The statistics above show that the medially accented words are very rare. Further, consulting the

accent dictionary revised in 1984 (NHK 1984), I found that all the words consisting of 2 OR pairs had exactly the same pitch accent pattern. The default accent location is the antepenultimate nucleus, thus those words consisting of two OR pairs are too short for the metrical count of the nuclei: lexical marking is purely arbitrary for these words. This is the reason why the words are classified into three classes of accentuation in (36a) evenly. Also, the lexical marking is stable.

Turning to the words consisting of three OR pairs, the distribution of these words according to the accent location is uneven. First, more than half of the words consisting of three OR pairs are unaccented. This fact is accounted for with reference to the analysis discussed in 3.2.4.4: if the word contains three OR pairs, the antepenultimate nucleus forms a degenerate foot which cannot be accented. Second, there is only one medially accented word. In addition to that listed by Hirayama, there is one more example of medially accented word, tamago 'egg', which is undergoing a change towards an unaccented word, according to my informants. Third, not only medially accented words, but also 11 of the finally accented words are changing to accentless words in NHK (1984). Among the words consisting of 3 OR pairs, 10 of the finally accented words above have changed to accentless words. Among the ten, four words in (37a-d) had completely changed to accentless words. Three in (37e-g) changed to accentless words, but the finally accented pitch patterns were listed as alternatives in NHK (1984). Three in (37h-j) maintain the final accent but also have an alternative accentless pattern. Further responses from my informants revealed that one more word has become an unaccented word from being finally accented. More significant is that the eleven words in question all turned out to be accentless, according to my informants. The following are the words in question:

(37)	1957 (Hirayama)	1984 (NHK)	1994	'gloss'
a.	*			
	ka wa ra (ga)	ka wa ra (ga)	ka wa ra (ga)	'tile'
b.	*			
	ha ta ke (ga)	ha ta ke (ga)	ha ta ke (ga)	'field (farm)'

c.

ko bu si (ga)	ko bu si (ga)	ko bu si (ga)	'fist'

d.

ha ya si (ga)	ha ya si (ga)	ha ya si (ga)	'bush'
	*		
	(ha ya si (ga))	NB: in ( ) is acceptable, only in special cases (NHK 1984)	

e.

i ta ti (ga)	i ta ti (ga)	i ta ti (ga)	'weasel'
	*		
	i ta ti (ga)		

f.

hi ga si (ga)	hi ga si (ga)	hi ga si (ga)	'east'
	*		
	hi ga si (ga)		

g.

ta su ki (ga)	ta su ki (ga)	ta su ki (ga)	'tasuki (a belt to gird up one's sleeves)'
	*		
	ta su ki (ga)		

h.

i to ma (ga)	i to ma (ga)	i to ma (ga)	'time off (from work)'
	*		
	i to ma (ga)		

i.

*	*		
ko yo mi (ga)	ko yo mi (ga)	ko yo mi (ga)	'almanac'
	ko yo mi (ga)		

j.

*	*		
ho to ke (ga)	ho to ke (ga)	ho to ke (ga)	'Buddha'
	ho to ke (ga)		

k.

*	*		
tu ru gi (ga)	tu ru gi (ga)	tu ru gi (ga)	'sword'

One may wonder whether the change to unaccented words undergone by final accented words is due to the fact that in isolation i.e. without any particles suffixed to the noun, both type of words cannot be distinguished from each other. If the change stems from the similar pitch pattern of the two, then the same phenomenon is expected for words consisting of two OR pairs. Yet I conclude that the answer is, no. In words consisting of two OR pairs, although finally accented words and unaccented words have the same pitch pattern when in isolation, the accentuation of the two classes of words is not changing from one to the other.

Nevertheless, note that the 'unstable' lexical marking is on the medial or final nucleus: if the lexical marking is already on the antepenultimate nucleus, the default accent location, then the lexical marking is stable on that nucleus.

Once the accent location is determined either lexically or in the course of derivation, the accent is interpreted as high pitch which is shared by the nuclei to the left except for the domain-initial nucleus.

3.2.6. Further evidence for metrical analysis

There are more 'long' morphologically simplex words, namely, many loan words e.g. from European languages, consisting of four or more OR pairs which assign accent on the antepenultimate nucleus. Also there is a class of concatenated nouns which behave as if they are morphologically simplex words without any internal structure. To begin, I discuss accent assignment in loan words.

3.2.6.1. Loan words and accent assignment

A piece of empirical evidence to prove that lexical marking may remain on the nucleus, constituting a degenerate foot, is provided by accent assignment in loan words consisting of three OR pairs. To show this, a longer word, to which an accent is assigned on the antepenultimate nucleus, is discussed. As McCawley (1968), Haraguchi (1991) and S. Yoshida (1991) also mention, long (consisting of four or more OR pairs) loan words place accent on the antepenultimate nucleus. I assume, as Haraguchi (1991) claimed, that loan words are categorised as lexically accentless words.

(38) Loan words

a. 4 OR constituent pairs

su to re su 'stress'

ra za ni a 'lasagne pasta (Italian)'

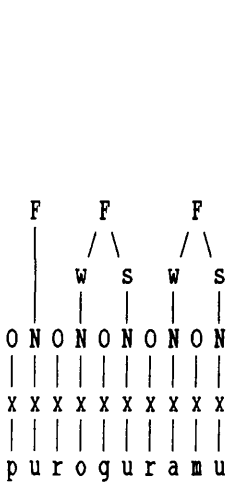
b. 5 OR constituent pairs

a ru ba i to 'part-time job (Arbeit 'work' in German)'

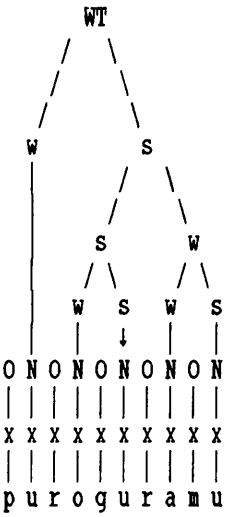
pu ro gu ra mu 'programme'

For example, accent assignment in puroguramu is as follows. Right-headed feet are constructed from the right-edge of the domain. The head nuclear position of the penultimate foot and the nuclei to the left share a high pitch excluding the domain-initial nucleus (39b).

(39) a.



b.



*

pu ro gu ra mu

We have observed that the loan words also conform to the same formalism of accent assignment.

Here, I focus on loan words consisting of 3 OR pairs. As for loan words consisting of three OR pairs, there are two types: 1) accentless and 2) accented on the antepenultimate nucleus. Given the equal condition, i.e. being loan words, their accent location is not specified in the lexicon[15], well-established commonly used loan words conform to the accentless pitch pattern.

The former, accentless type is derived as follows, where the degenerate foot cannot be assigned an accent (3.2.4.4). They tend to be loan words which have been used for a long time and in everyday speech, for example:

[15]In Japanese, loan words do not take into account the location of stress (accent) in the original language from which the word is borrowed, in the assignment of pitch accent (McCawley 1968, S.Yoshida 1991).

(40)

a. ta ba ko 'tabacco'

b. ba ke tu 'bucket'

Some of the loan words consisting of 3 OR pairs assign accent on the antepenultimate nucleus, which is at the same time the nucleus constituting a degenerate foot. The lexical accent assignment may land on the degenerate foot. Some of these words are used frequently in everyday life, yet, are relatively new loan-words, in comparison to those of (40):

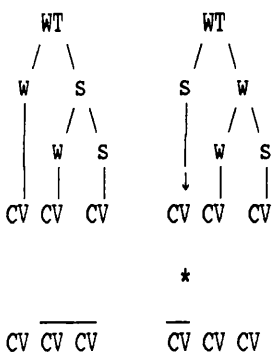
(41)

a. pa N da 'panda bear'

b. te re bi 'TV'

It also lends support for right-headed binary foot structure in accent assignment in Standard Japanese; we never find a loan word consisting of 3 OR pairs, whose accent is on the medial nucleus, or on the final nucleus: they are all either accentless or accented on the antepenultimate nucleus.

(42)a.



b.

In the following section, I discuss how an accent is assigned to concatenated nouns which behave as if they were morphologically simplex words, and then demonstrate how a so-called accent shift phenomenon is predicted by the theory I have presented so far.

3.2.6.2. Non-analytic concatenated words

In this section I concentrate on how one type of noun-noun concatenation behaves as if it were a non-analysable word without internal structure.

Some of the words consisting of more than one noun assign accent in the same manner as a simplex native word consisting of four or more OR pairs. I propose that these words are not in any true sense 'compounds' as they were believed to be. In standard analyses (McCawley 1968, Poser 1990)[16], 'compound' nouns ('compound' is here used in general terms to refer to any concatenation of more than one noun) were divided into two groups according to the size of the rightmost noun component. If the rightmost term (noun) is 'trisyllabic' or longer, the accent of the compound is assigned on the initial syllable of the rightmost term. But if the rightmost term is disyllabic, the accent of the compound is assigned to the final syllable of the penultimate term in compounding. However, the reason why in one case the initial syllable of the rightmost term, and in the other case the final syllable of the penultimate term are chosen to be accented, is not clear. I shall posit a unified account for both types of compounding classified in standard analyses. They both belong to one morphological class, which I call NON-ANALYTIC, following the terminology introduced by Kaye & Vergnaud (1990).

When two nouns are concatenated, the two juxtaposed nouns together behave as if they formed a single non-analysable word without internal structure.

I outline the idea of non-analytic morphology briefly. There is a class of words whose members behave as if they were single domains with no internal structure, even though they are constructed from more than one lexical item (e.g. nouns). In one class of English words stress is assigned to the phonetically interpreted antepenultimate nucleus of the word (Kaye & Vergnaud 1990)[17].

---

[16]See also Chapter 2 for a detailed explanation of the standard analysis of 'compound' nouns.

[17]This only counts nuclei which are unlicensed, therefore a domain final empty nucleus, which is licensed in English, is excluded for the purposes of stress assignment, i.e. it is not projected to metrical structure.

(43) américa
cínema
aspáragus
cápital

Also, in one type of concatenated word which behaves as if it were non-analysable, the stress assignment is identical to that of a morphologically simplex word. For example, let us take the following words:

(44) a. kilo + meter --> kilóměter

b. blue + berry --> blúeběrry

In words such as those in (44), stress is assigned to the antepenultimate nucleus, as if the word had no internal morphology. In those forms, stress is assigned regardless of the stress of either morpheme A or B. This type of word is claimed to have non-analytic structure (Kaye & Vergnaud 1990), in which the morphemes A and B behave as if they formed a single word with no internal structure.

(45) A + B ---> [A B] *[[A][B]]

Likewise, in Japanese non-analytic concatenated nouns, the accent is assigned in the same way as in a morphologically simplex noun. As I have explained earlier in this section, in a noun whose accent is not specified in the lexicon, such as uguisu, the head nucleus of the penultimate foot (i.e. antepenultimate nucleus) is the head nucleus of the domain, and is accented in the derivation.

This class of noun-noun concatenation assigns a pitch accent on the antepenultimate nucleus. Let me refer to a set of data:

(46)

	NOUN A		NOUN B		A-B concatenated
a.	ha na	+	ka ta	---->	ha na ga ta
	'flower'		'shape'		'star (popular person)'
b.	a to	+	a si	---->	a to a si
	'behind'		'leg'		'hind legs'
c.	u si ro	+	a si	---->	u si ro a si
	'rear'		'leg'		'hind legs'
d.	i si	+	a ta ma	---->	i si a ta ma
	'stone'		'head'		'hard head'
e.	ha ge	+	a ta ma	---->	ha ge a ta ma
	'baldness'		'head'		'bald head
f.	mi zu	+	ka ga mi	---->	mi zu ka ga mi
	'water'		'mirror'		'reflection in the water'
g.	ya ma	+	mi ti	---->	ya ma mi ti
	'mountain'		'street'		'mountain foot path'

	NOUN A		NOUN B		A-B concatenated
h.[18]	*				*
	a me	+	mi ti	---->	a ma mi ti
	'rain'		'street'		'rainy street'
i.					*
	sa ku ra	+	mi ti	---->	sa ku ra mi ti
	'cherry'		'street'		'cherry road'
j.	*				*
	u mi	+	tu ba me	---->	u mi tu ba me
	'sea'		'swallow'		'(stormy) petrel'

Let me take an example from (46). In umitubame '(stormy) petrel', noun A umi 'sea' has the lexical accent on the initial nucleus, and noun B tubame 'swallow' is a lexically accentless word, when in isolation. umitubame has an accent on the antepenultimate nucleus tu.

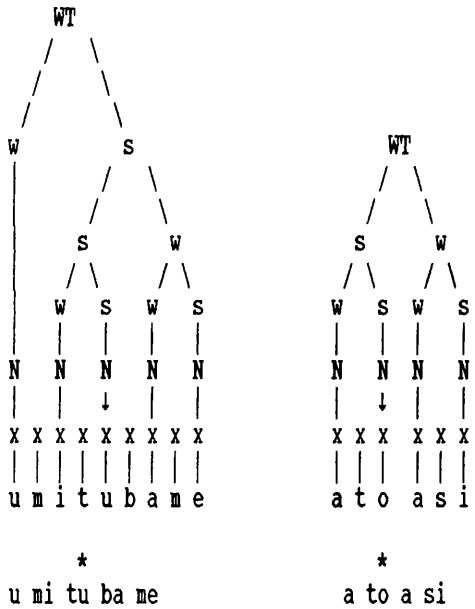
(47)

*				*
u mi	+	tu ba me	---->	u mi tu ba me
'sea'		'swallow'		'(stormy) petrel'

The concatenated word belongs to the non-analytic class and behaves as if it were a non-analysable word without internal structure. That is, the word is stored in the lexicon as a new unmarked word: the lexical information i.e. lexical accentuation of the subconstituent nouns is not respected. Consequently the word is assigned an accent on the antepenultimate nucleus.

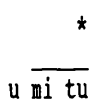
[18]Although I do not discuss the point in this thesis, readers should, however, note that e, the final vowel of ame, changes to a in the concatenated form amamiti.

(48)

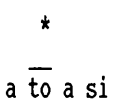


In this manner, the antepenultimate nucleus is accented. The head nucleus of the domain and nuclei to the left receive the high-pitch interpretation of the pitch accent, except for the inaccessible domain-initial nucleus (3.2.4).

(49) a.



b.



Bearing the formulation in mind, in 3.3, I shall discuss the predictions made by the metrical structure I propose.

3.3.0. Predictions made by the proposal

- On so-called accent 'shift' -

This section demonstrates what my proposal of right-headed binary feet (licensing relations) in Standard Japanese predicts, at the same time clarifying what kind of constraints are imposed on a nucleus which bears pitch accent. To do this, I shall focus on words which assign accent on

preantepenultimate nuclear position, this pattern stemming from the fact that the expected accent location, the antepenultimate nuclear position (3.2.4.2, 3.2.4.4), does not constitute a nucleus suitable for bearing an accent.

3.3.1. Preantepenult Accent

I have explained that in a non-analytic domain, an accent is assigned on the antepenultimate nucleus (3.2.6.1). This section focuses on words whose accent lands on preantepenultimate nucleus, to explain that an accent cannot be assigned to a governed/licensed nuclear position at the P^0 (0 projection or skeleton) level.

As I explained in Chapter 2, in previous analyses, an accent was said to 'shift' from the expected location (antepenultimate) to the next unit to the left (preantepenultimate), for example by the operation of a 'shift rule' such as 'Move α' (Haraguchi 1991, see also Chapter 2 for a detailed explanation). This rule describes the event of accent 'relocation', however it does not explain the reason why the 'shift' has to be made one unit to the left, rather than to the right. My proposal of right-headed foot structure predicts the landing site of an accent as a natural consequence of foot construction, and not as a 'shift' of accent location.

There are four types of words whose accent is assigned on the preantepenultimate nucleus. The first type comprises those words whose antepenultimate nucleus is the second member of a nuclear sequence. Another contains those words whose antepenultimate nucleus coincides with N (1.2.2.2). The third group consists of words in which the antepenultimate nucleus is subject to non-interpretation of the element I° or U°. The final case involves a geminate (1.2.2.4). Devoting a separate section to each of these cases, I show how my proposal of right-headed binary feet predicts accent assignment as a natural course of derivation.

3.3.1.1. Nuclear sequences

In this section I show that the governed member of a branching nucleus, which may formed from a nuclear sequence under certain conditions to be discussed in 3.3.2.1, is not projected to nuclear projections. If the antepenultimate nucleus of the word coincides with the second member of a nuclear sequence, then in such a case, the landing site of pitch accent is always preantepenultimate nuclear position. I demonstrate that this so-called 'shift' of accent location is not actually a 'shift' but is naturally predicted by the foot structure I propose above. Also, another fact which emerges is not all vowel sequences are subject to this 'shift' phenomena; rather, it is restricted to 'heavy diphthongs' and 'long vowels'. However, the distinction between a branching nucleus and a true sequence of two nuclei in fact predicts that this should be the case. The words below in (50) and (51) are non-analytic concatenated words (3.2.6.2). The words in (50) are assigned accent on the antepenultimate nucleus:

(50)[19]

	TERM 1		TERM 2		CONCATENATED FORM
a.	*				*
	ka i gi	+	si tu	--->	ka i gi si tu
	'meeting'		'room'		'meeting room'
b.					*
	ni N ki	+	ka bu	--->	ni N ki ka bu
	'popularity'		'stock'		'popular stock'

[19]Terms 1 in (50) are Sino-compounds made by combining more than one Sino-morpheme. Sino-morphemes consist of one Chinese character, and are borrowed from the Chinese language. Sino-compounds, which are a combination of usually two Sino-morphemes, are productive in Japanese. Nuclear sequences are likely to be found in Sino-compounds. The fact that the terms are already compound form explains the reason why the 'quadrisyllabic' terms may be accentless, a fact which is unexpected, given the analysis in 3.2.4.4. An accentless domain consisting of more than four OR pairs should assign accent on the antepenultimate nucleus, and only words consisting of less than three OR pairs can be accentless. I simply employ these Sino-compounds here, without discussing morphology within the terms A or B.

c.

```
  *              *                *
 ge N go    +   ga ku   --->   ge N go ga ku
'language'     'study'          'linguistics'
```

All the concatenated forms above are not real compounds. Rather they are non-analytic words (3.2.6.2). I have explained that in non-analytic words, the accent is placed on the antepenultimate nucleus (3.2.6.2), as the forms in (50) show. In contrast to the words in (50), the words in (51) are assigned accent on the preantepenultimate nucleus:

(51)

	TERM 1	TERM 2	CONCATENATED FORM
a.	e N so o	si tu	e N so o si tu
	'music performance'	'room'	'music room'
b.	gi N ko o	ka bu	gi N ko o ka bu
	'bank	'stock'	'bank stocks'
c.	sya ka i	ga ku	sya ka i ga ku
	'society'	'study'	'sociology'

If the antepenultimate nucleus is the second member of an 'apparent long vowel' or a 'heavy diphthong', the accent is assigned to preantepenultimate nuclear position. Also note that this type of accent assignment is ruled out in the case of any other nuclear sequences, as the forms in (52) show:

(52) TERM 1 TERM 2 CONCATENATED FORM

a.

		*		*
hi ka e	+	si tu	---->	hi ka e si tu
'wait'		'room'		'a waiting room'

b.

*				*
a o	+	mu si	---->	a o mu si
'blue'		'insect'		'green caterpillar'

c.

				*
i e	+	ha e	---->	i e ba e
'house'		'fly'		'housefly'

The forms in (52) demonstrate that not all nuclear (vowel) sequences are subject to the accent 'shift' to preantepenultimate nucleus.

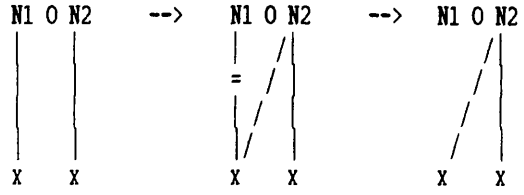
Below I shall show the reason why the forms in (51) have to be accented on the preantepenultimate nuclear position.

3.3.1.2. Nuclear fusion and tone assignment

This section explains why the second nuclear position of an 'apparent long vowel' or a 'heavy diphthong' is not an appropriate location for accent assignment in Standard Japanese, in the light of the proposal by S.Yoshida (1991) on nuclear sequences.

S.Yoshida (1991) proposes that in Standard Japanese two adjacent nuclear positions are fused and collapsed into one nucleus. This process is called NUCLEAR FUSION, which yields a branching nucleus:

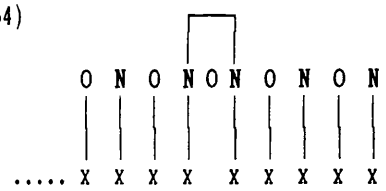
(53) Nuclear Fusion (S.Yoshida 1991)



Nuclear fusion occurs if i) N1 and N2 are linked to a single segment, or ii) N1 and N2 are linked to a charmed segment and a simplex charmless segment, respectively (S.Yoshida 1991). a (A+) is a charmed segment, and i, u (I°, U°) are simplex segments. The segmental requirement in nuclear fusion is necessary in order that the governing relation within the fused nucleus be satisfied. As a result of nuclear fusion, the fused nucleus becomes a branching nucleus which is a head-initial governing domain (1.1.1.5). Therefore the initial skeletal point of the branching nucleus has to dominate a charmed segment to govern the other point associated to a simplex segment. Also, in order for this process to apply, there must be no intervening non-nuclear segment between the two nuclei (S.Yoshida 1991).

Bearing this nuclear fusion in mind, let us consider a case of accent assignment where the antepenultimate nuclear position, which is the default accent location, coincides with the second position of a nuclear sequence:

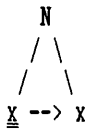
(54)



In (54), the antepenultimate nucleus is adjacent to the preceding nuclear point at the skeletal level. Under these circumstances, the two adjacent nuclei enter into an interconstituent governing relation, which is head-final (54). In Standard Japanese, this type of interconstituent government results in the governed nucleus merging with the governor (S.Yoshida 1991). As the result of nuclear fusion, the two nuclear positions form a branching nucleus. Thus for the branching nucleus to be formed, the two nuclear positions have to be occupied by the appropriate segments. As I explained in more detail

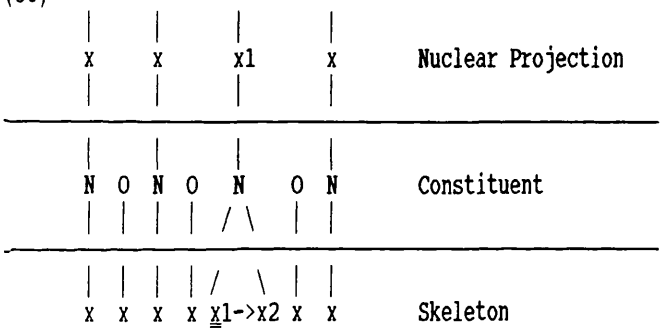
above, either both points in question are occupied by a single segment; or, when the point to the right has only a simplex charmless element, the point to the left has to contain a positively charmed element. In other words, the former is the representation of a so called 'apparent long vowel', and the latter is a 'heavy diphthong'.

(55)



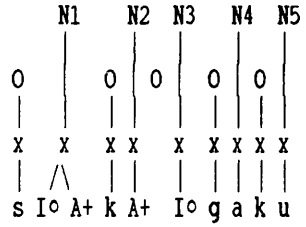
Now consider foot construction. Feet are constructed at nuclear projection levels. Consider the nuclear projection, to which only the head position (x1) of the branching nucleus is projected:

(56)



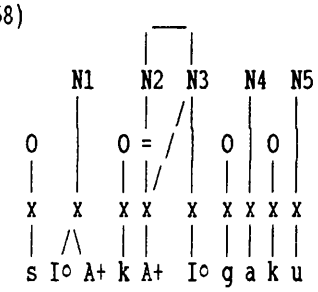
Thus if the antepenultimate nucleus coincides with a branching nucleus, the head position (the one on the left) of the branching nucleus is accented. I shall take the example syakaigaku 'sociology' and show how accent assignment is carried out. The lexical representation is presented in (57). Note that N2 and N3 are adjacent at the skeletal level.

(57)[20]



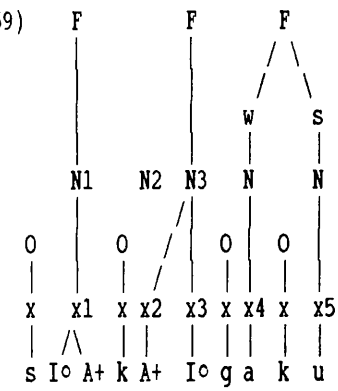
N2 and N3 are adjacent to each other, and thus become fused.

(58)



Now consider construction of feet to assign accent. Feet are built from the right-edge of the word. From N3, which is branching, the head position, x2, is projected. Note that only the head position is projected from the nucleus which is branching.

(59)



(Note: only nuclear positions are indexed)

The head of the penultimate foot is assigned the accent. The nuclear position projected to form the penultimate foot is x2, the head position of the branching nucleus. Therefore the accent of the word

---

[20]I follow the representation of Cy-sequences in Japanese (a consonant followed by a palatal glide) as adopted in S. Yoshida (1991): rather than employing a branching onset to occupy the C and the glide, S.Yoshida (1991) syllabified the consonantal segment into the onset, followed by a light diphthong.

syakaigaku is assigned on x2. The accent is assigned as in (60):

(60)
```
      *
sya ka i ga ku
```

The pitch accent is interpreted as high pitch, which is shared by the head nucleus of the domain and the nuclei to the left (3.2.4), except for the domain initial nucleus (3.2.4). As a result, the accent assignment and the pitch pattern of the word syakaigaku are:

(61)
```
      *
sya ka i ga ku
```

In this manner, when the antepenultimate nucleus is the second nucleus of a 'long vowel' or a 'heavy diphthong', the accent is assigned to preantepenultimate nuclear position. Preantepenult accent, thus, does not occur because of a 'shift' of accent from the antepenultimate nuclear position, but is assigned following the regular metrical pattern.

Another point to be clarified is the reason why the forms in (52), whose antepenultimate nucleus coincides with the second member of a nuclear sequence such as ao, ae and ie, are not subject to preantepenult accent assignment. Note that in the case of a nuclear sequence which is subject to nuclear fusion, either both points in question are occupied by a single element or, when the point to the right has only a simplex charmless element, the point to the left has to contain a positively charmed element. Nuclear sequences contained in the forms in (52) are not subject to nuclear fusion and thus do not form a branching nucleus: ae, ao and ie do not satisfy the segmental constraints imposed on branching nucleus, having a nuclear position on the right dominating a complex expression which cannot be governed by the simplex constituent head. In this way it may be explained why the accent is assigned on the preantepenultimate nucleus only when the antepenult coincides with the second member of a so-called 'heavy diphthong' or an 'apparent long vowel'.

One may wonder, then, whether Standard Japanese has branching nuclei lexically, since they are not derived via any fusion operation. Recall the words discussed in Chapter 1 (1.2.1): two

nuclear positions contained in a nuclear sequence ('heavy diphthong' or 'long vowel') do not necessarily share the same pitch. If all the 'heavy diphthongs' and 'apparent long vowels' were to constitute lexically branching nuclei, the following pitch pattern could not be explained:

(62)a. *

ho o ki 'broom'

byo o ki 'sickness'

b. *

ta i ki 'wait'

to i si 'whetstone'

The first member and the second member do not share the same pitch. Only one of the members within the nuclear sequence can be high-pitched, but not both. If the two positions were a tautosyllabic nuclear sequence, however, the pitch should be shared by the both positions. Thus, a nuclear sequence can not constitute a branching nucleus lexically.

In the following sections, I shall discuss what other restrictions are imposed on accent bearing nuclei, and how these restrictions interact with accent assignment.

3.3.2. Accent and P-licensing

There are words whose accent assignment is subject to p-licensing: a nucleus within an inter-onset licensing domain is p-licensed, and thus receives no phonetic interpretation (Kaye 1993: 94). Such a nucleus cannot be assigned an accent in Standard Japanese. Each subsection below is devoted to a demonstration of how accent assignment in various type of words is subject to p-licensing.

To begin, the following section discusses the case where the antepenultimate nuclear position

coincides with a velar approximant N. To explain why an N is subject to p-licensing in accent assignment, I shall discuss the structure of N, first.

3.3.2.1 The structure of N

Now I observe closely the structure of N to account for the reason why N can be realised as high-pitched, but cannot be accented. Standard Japanese does not allow any words, including compounds and loanwords, to carry their accent on N [ũ̠].

The following forms in (63) demonstrate that a high pitch can be realised on the velar approximant N [ũ̠]:

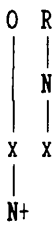
(63)a. b. *

o N̄ na ni h̄o N

'woman' 'Japan'

The fact that N can be high-pitched supports the analysis of S.Yoshida (1991) where he claimed that the structure of N involves an empty nuclear position preceded by an onset occupied by N+ (nasal element) (64a), and not the rhymal complement, as syllabified in the standard analysis (Poser 1984, Abe 1987) (64b):

(64) a.



b.

As I mentioned in Chapter 1 (1.2.2.2), however, it is questionable why only an onset dominated by N+ can be followed by an empty nuclear position in Standard Japanese. In Japanese, domain-final categories are not p-licensed (Kaye 1992, see also 1.1.1.4), meaning that a word in Japanese must end in an audible vowel. Then, the velar approximant N which is productive in the word final position in Japanese, cannot be empty. Now I shall pursue which expression (vowel) is contained within N.

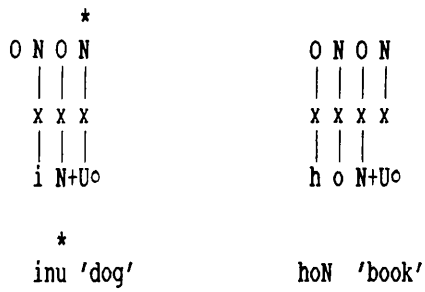
To help determine what is occupying the nuclear position involved in the interpretation of N, if it is not empty, a clue is provided by the historical development of the sound. It is known that historically the negative morpheme -nu developed into N in modern Japanese. For example, Kindaichi (1932) notes that the word final nu has become N:

(65) dekinu ---> dekiN

'possible-neg.'

I propose that the structure of N involves the same elements as that of nu, based on this historical development and the complementary distribution of N and nu in Standard Japanese, which I discuss subsequently. However, they do differ in pronunciation, so I have to explain how they can contain the same elemental expression. In N, the nuclear position dominates U° element unassociated to the point, preceded by an onset occupying nasal element N+ (see also Chapter 1).

(66)a.



b.

As shown in (66), nu, which typically appears with an accent, is distinguished from N, depending on whether U° element to be associated to nuclear position or not.

The pronunciation of a word-final N[21] is transcribed as [ɯ̃] (Hattori 1930, S.Yoshida 1990,1991), a velar approximant, and this transcription lends support in favour of my analysis. At the same time, S. Yoshida (1991) claims that in Standard Japanese, [ɯ̟], unrounded high back vowel,

[21]I mention the fact that the pronunciation discussed here only applies to N which appears word-finally, since the word-medial N followed by a stop, affricate or nasal appears homorganic to the consonant which immediately follows N (see 3.3.2.2 for a detailed discussion on the homorganicity of N).

dominates U° element unassociated to the nuclear position, whereas the rounded counterpart [u] has the element U° associated to the position. Then, the transcription of N [ũɯ] is explained as the unrounded back vowel [ɯ] which is concurrently nasal [ũɯ] (67b):

(67) a. O N b. O N

X X X

U° [ɯ] N+ U° [ũɯ]

In Standard Japanese, no word can have its the accent on N, whereas the sequence nu typically appears accented. An accented nucleus is the head of the word domain. In other words, if accented, the nucleus has to fulfil the requirements expected from the licenser of the domain. As S.Yoshida (1991) points out, in order for the nuclear position which dominates an unassociated element to be a licenser, the U° element has to be associated to the skeleton. S.Yoshida (1991) proposes that, in the long vowel u:, for the head position of the branching nucleus[22] to govern the complement position, the element has to be associated to the head position: in this instance, the long vowel is pronounced with lip rounding (68b). Similarly, for the nuclear position to bear an accent i.e. to become the head nucleus of the word, the element U° has to be associated to the nuclear position (68c):

(68) a. O N b. O N c. O N

X X X X

U° U° U°

[ɯ] [u:] [u]

There are words which are lexically accented on the vowel u, which is pronounced with lip rounding [u]. In other words, for the nuclear position to be accented, the element U° has to be associated to the nuclear position. Thus, for the nuclear position involved in the realisation of N to be the

[22]As I discussed in 3.3.1, a long vowel is originally a sequence of two separate contiguous nuclei. As the result of nuclear fusion (see 3.3.1), the two nuclear positions become associated to one nucleus.

licenser (to be accented), the U° element is associated to the nuclear position, and is pronounced with lip rounding [nu]. Therefore, N, whose nuclear position is not associated to the element U° can never be accented: or rather, when accented, N turns out to be nu.

Another distributional fact is that an N never occurs in word-initial position where nu can be found. On the other hand, nu rarely occurs in word-final position, where N is productive. Even if nu occurs in word-final position, it is accented: for the sequence in question to be accented, it has to be realised as nu. There seems to be only one true example of a word which ends with an unaccented nu, which is kinu 'silk'; other apparent examples involve a morphological derivation exemplified by non-past form Verbs which involves the sequence nu derived from the stem-final consonant n plus the non-past morpheme -u e.g. sinu 'die' (sin- 'to die' plus -u). Although one counter-example is found in kinu, one among 68970 words[23] amounts to no more than a drop in the ocean, and is not sufficiently productive to deny the analysis I present here. Indeed, further examination proves a big gap in the distribution of nu: the following table gives the figure of all the words among the list of 68970, ending with na, ni, nu, ne and no:

(69) Among words containing 2 or 3 OR pairs, the following is the number of words ending in nV where V is:

a	--na	235
i	--ni	139
u	--nu	12
e	--ne	172
o	--no	436

Words ending with nu are proportionally very few. Also, careful observation shows that the 12 attested words are the compiled by concatenated words whose right hand subconstituent is kinu 'silk' or inu 'dog'. This gap lends further support to the analysis that nu and N have in fact one single

[23]This figure is the number of native words in EDICT Japanese/English Dictionary (Breen 1994). Many thanks go to Prof. Jonathan Kaye for running his own computer programme on EDICT, to pick up and count all the phonological sequences we wish to pursue within the list.

identity, which appears as nu in one context and as N elsewhere. Bearing this structure in mind, I shall show examples of how an accent is assigned to a word whose antepenultimate nucleus coincides with N.

3.3.2.2. N and pitch accent assignment

This section discusses how an accent is assigned on the preantepenultimate nucleus when the penultimate nucleus coincides with N. To begin with, I present a set of data. The three forms in this set are non-analytic. Note that word-internal N manifests itself as a nasal homorganic to the stop/nasal consonant which follows it.

(70) **TERM A** **TERM B** **CONCATENATED WORD**

a.

	*			*
	ha si	+ ha ko	--->	ha si ba ko [24]
	'chop sticks'	'box'		'chop-stick case'

b.

	*			*
	ho N	+ ha ko	--->	ho N ba ko [hombako]
	'book'	'box'		'book case'

c.

	*			*
	mi ka N	+ ha ko	--->	mi ka N ba ko [mikambako]
	'tangerine'	'box'		'tangerine cardboard box'

d.

*				*
ho N	+	ta na	--->	ho N da na [hondana]
'book'		'shelf'		'book shelf'

e.

		*		*
o N	+	ga ku	--->	o N ga ku [oŋgaku]
'sound'		'tune'		'music'

f.

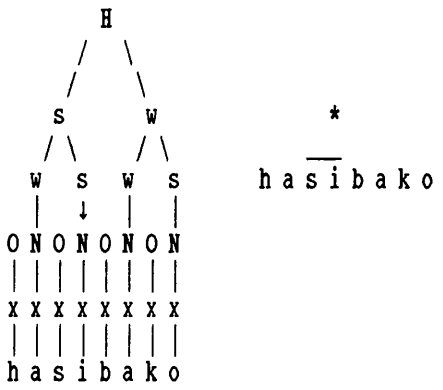
*		*		*
ko N	+	ka i	--->	ko N ka i [koŋkai]
'this'		'time'		'this time'

Consider the word hasibako. Two nouns are juxtaposed and they behave as if they form a single domain without any internal structure. Feet are constructed from the right-edge of the word, and the head

[24]Note that the initial consonant of hako undergoes 'sequencial voicing' and h changes to its 'voiced' counterpart, b (-bako). I claim that in terms of tone assignment, this type of concatenation of nouns is non-analytic, in which the morphemes involved behave as if they form a single word. I am assuming that 'sequential voicing' occurs independently of tone assignment.

nucleus of the penultimate foot is the accented nucleus (3.2.4.1):

(71)

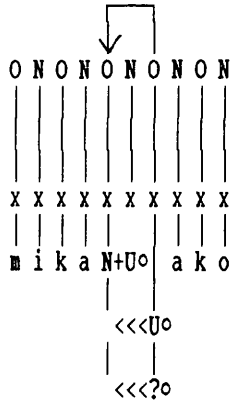


The antepenultimate nucleus, the head of the penultimate foot, is the lisencer of the domain.

Following the accent assignment of hasibako 'chop sticks case', I assume that in the forms (70bc), the accent should be placed on the antepenultimate nucleus, which dominates N, in both of the words above. However, contrary to the assumption, accents are not assigned to the expected nucleus. All the other forms in (70) have the antepenultimate nucleus dominating N, and the accent is placed on the preantepenultimate nucleus.

As I mentioned in Chapter 1 (1.2.2.2), the homorganicity observed between a word-internal N and a stop/nasal consonant which follows the N is the manifestation of licensing relations contracted by the two onset positions. Take the example mikaNbako 'orange box', in which the word-internal N is homorganic to its following consonant, b:

(72)



mikambako

Now the question arises as to how this inter-onset licensing affects the nucleus sandwiched by the two onsets. Recall that a nuclear position within an inter-onset domain is p-licensed and receives no phonetic interpretation. I shall cite the relevant section of the phonological E(mpty) C(ategory) P(rinciple) from Kaye (1993):

(73) The Phonological ECP: A p-licensed (empty) category receives no phonetic interpretation.

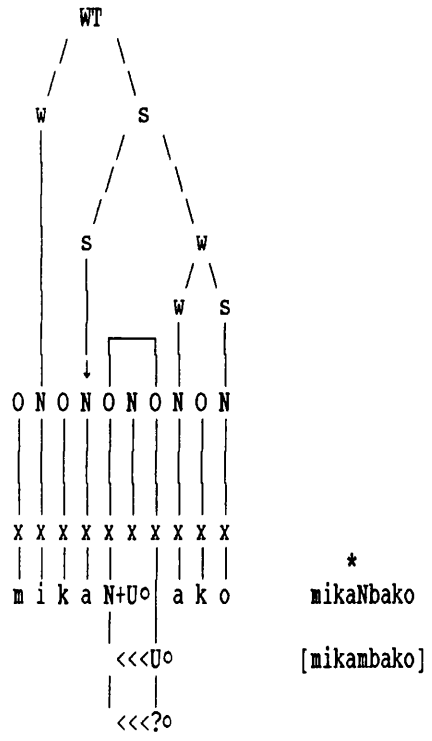
P-licensing: A nucleus within an inter-onset domain.

(Kaye 1993: 94)

The nuclear position sandwiched by the two onsets which contract a licensing relation does not receive any phonetic interpretation. Then, the unassociated Uo element, which is dominated by the sandwiched nuclear position, cannot be interpreted.

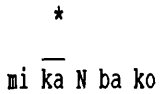
Bearing p-licensing in mind, let us consider foot construction in the word mikaNbako. The nuclear position is empty, being p-licensed within the inter-onset domain, and is not projected to the nuclear projection in Standard Japanese. Thus the penultimate foot does not branch:

(74)



This is why the accent is assigned to preantepenultimate nuclear position, which is a predicted landing site for an accent. Then, the pitch accent is interpreted as high pitch: no other nuclei receive the high pitch interpretation, because the nucleus to the left is the inaccessible domain-initial nucleus.

(75)



This shows that preantepenultimate accent assignment does not actually constitute a 'shift' from the antepenultimate syllable which coincides with N, to its preceding position. The accent location is predictable from the metrical organisation.

There are two more instances of preantepenultimate accent assignment which stem from the antepenultimate nucleus being subject to p-licensing. The next section presents further discussion of p-licensed nuclear positions, focusing on the case where the antepenultimate nucleus dominating Io or Uo is subject to non-interpretation (so called high vowel 'devoicing').

3.3.2.3. Non-interpretation of I∘ and U∘

- So called 'Devoiced' high vowels -

In this section, I shall explain the process of so called 'high vowel devoicing' in terms of government, to illustrate another example of the correlation between p-licensing and accent assignment. In Standard Japanese, it is said that a 'devoiced' high vowel is avoided as a location for accent assignment (Haraguchi 1977, 1991), and an accented high vowel is less likely to undergo 'devoicing', in comparison to unaccented high vowels in the same environment (Sakurai 1985). My aim here is to attempt to offer an account of why a 'devoiced' vowel should be avoided for accent assignment.

I explain the process of 'high vowel devoicing' in terms of government. A nuclear position dominating either I∘(i) or U∘ (u) is subject to non-interpretation when the position is sandwiched between onsets dominating p,s,t,k or h, (76a), or when it appears word finally and is preceded by an onset dominating one of these five consonants (76b):

(76) NB: ∘ under a vowel denotes that the relevant nuclear position is not interpreted

a. kusi [kuɯʃi] 'comb' (ɯ: ∘)

hisi [hiʃi] 'water chestnut' (i: ∘)

b. kakasi [kakaʃi] 'scarecrow' (i: ∘)

karasu [karasuɯ] 'crow' (ɯ: ∘)

In the following examples, lexical accents are placed on those nuclei which are found in the expected non-interpretation contexts.

(77) a. *

na s̄i [naʃi]

'pear'

*

na s̄i -ka ra [naʃikara]

'-from' (from a pear)

b. *

ne t̄u [netsuɯ]

'fever'

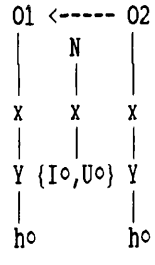
*

ne t̄u -ka ra [netsuɯkara]

'-from' (from fever)

To consider the correlation between the non-interpretation of high vowels and accentuation, I shall look closely at the mechanism of the process. The non-interpretation of i or u occurs when the flanking onsets dominate 'voiceless' segments, i.e. /k,s,t,h,p/. Following the proposal of KLV (1990), S.Yoshida (1991) claims that a 'voiced' consonant and a 'voiceless' consonant are identified by the presence of a L- element or a h° element in the segmental structure, respectively. Since the traditional term 'voicing' is caused by the Bernoulli Effect, which has no laryngeal activity, this is regarded as the default status of the glottis. According to S. Yoshida (1991), 'devoicing' of high vowels between two 'voiceless' consonants is not due to the loss of 'voicing', assimilating to the 'voiceless'-ness of the surrounding consonants: rather, it stems from the fact that the interpretation of the nuclear element is lost within the licensing domain created by two onsets, flanking a nucleus which dominates I° or U°. S.Yoshida (1991) claims that two onsets flanking a nucleus that dominates either I° or U° constitute a head-final domain if each one of these onsets is occupied by a segment containing a h° but not the L-element. And the nucleus contained within the inter-onset licensing domain is p-licensed and is thus not phonetically realized:

(78)



Y = zero or some element(s) other than L-

This is exactly the case where a nucleus is p-licensed within an inter-onset domain. When the antepenultimate nucleus is p-licensed, then the accent falls on the preantepenultimate.

To begin with, let us consider the following set of words, these forms consisting of more than one noun joined in a non-analytic way; accordingly their accent is placed on the antepenultimate nucleus (3.2.4.2, 3.2.4.4). In section 3.2.4.2 and 3.2.4.4, accent assignment in a non-analytic domain without lexical accent was discussed. The antepenultimate nucleus, which is the head of the penultimate foot, is the head of the domain, and as a result, it is accented. Here I demonstrate

another correlation between a p-licensed nucleus and accent assignment.

When the antepenultimate nucleus dominates either of the elements I^{o} or U^{o} (a high vowel) and is located within the potential environment for non-interpretation, the accent may not be assigned to the nucleus. See the following set of data; the antepenultimate nucleus dominates I^{o} or U^{o}, which is sandwiched between consonants belonging to the set /k,s,t,h,p/:

(79)

	TERM A		TERM B	CONCATENATED FORM
a.				
			*	*
	fu k ka tu	+	sa i	fu k ka tu sa i
	'revival'		'festival'	
				*
				fu k ka tu sa i
				o
				'Easter'
b.				
	*		*	*
	ta N pa ku	+	se ki	ta N pa ku se ki
	'albumin'		'stone'	
				*
				ta N pa ku se ki
				o
				'opal'

c.

		*	*
bo o e ki	+	syo o	bo o e ki syo o
'trade'		'merchant'	

*
bo o e ki syo o
o
'trader'

d.

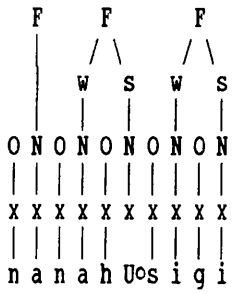
*			*
na na	+	hu si gi	na na hu si gi
'seven'		'wonder'	

*
na na hu si gi
o
'seven wonders'

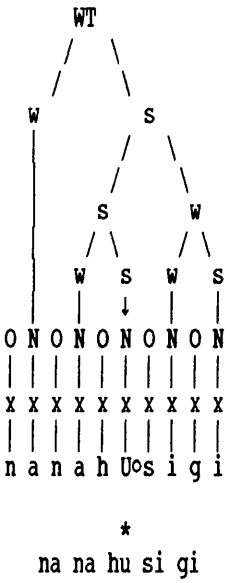
The reason the data above have two tone patterns is that the antepenultimate nucleus is in the environment for non-interpretation of I° or U°: when the interpretation of I° or U° is not prohibited, the accent is assigned to the antepenultimate nucleus, but when it is blocked, the accent has to be located elsewhere. To illustrate, I show the derivation of the tone pattern of nanahusigi. This concatenation of two terms nana 'seven' and husigi 'wonder' is non-analytic, thus they behave as if they formed a single word with no internal structure. When the non-interpretation of the antepenultimate nucleus does not occur, nanahusigi has its accent on the antepenultimate nucleus.

The derivation is as follows. Feet are constructed from the right-edge of the word (80a), and the head nucleus of the penultimate foot is the accented nucleus (80b):

(80)a.

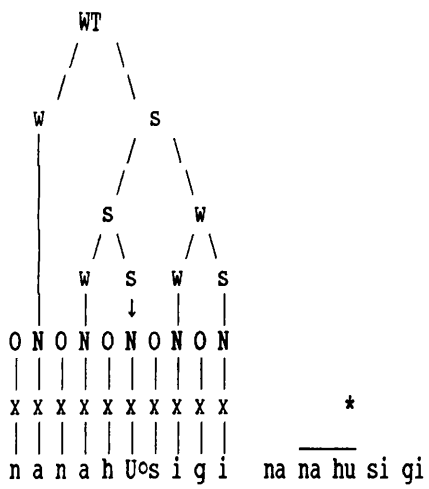


b.



The head nucleus of the penultimate foot is the head of the domain. Recall that a nucleus dominating the unassociated U° element has to be associated in order for the nucleus to be a licenser (see 3.3.2.1). The accent is interpreted as high pitch, and the nuclei to the left except for the inaccessible domain-initial nucleus are high-pitched.

(81)

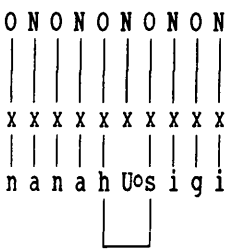


Accordingly, the assignment of accent and high pitch is explained.

Turning to the case where the antepenultimate nucleus is not interpreted, the nucleus sandwiched by the two onsets is p-licensed. Recall the phonological ECP (Kaye 1993), which states that a nuclear position within an inter-onset domain is p-licensed and receives no phonetic

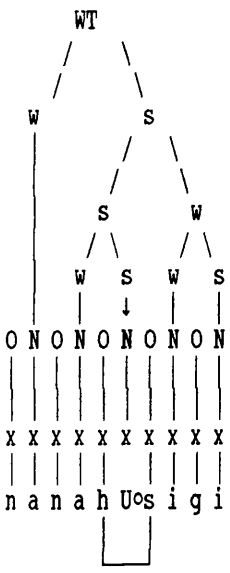
interpretation. Also, note that such a nucleus cannot be a licenser, being itself p-licensed. A p-licensed nucleus, an empty position, is not projected to the nuclear projections. Bearing the ECP in mind, I illustrate the accent assignment in the form nanahusigi, when the antepenultimate nucleus is not interpreted. Being flanked by onsets dominating h and s, which contract an inter-onset licensing, the nucleus within the inter-onset domain is p-licensed:

(82) a.



Feet are constructed from the right-edge of the word. The head nucleus of the penultimate foot is the accented nucleus (3.2.4.2). However, note that a p-licensed nucleus cannot license another nucleus to be the head of a foot (and ultimatelly of a word):

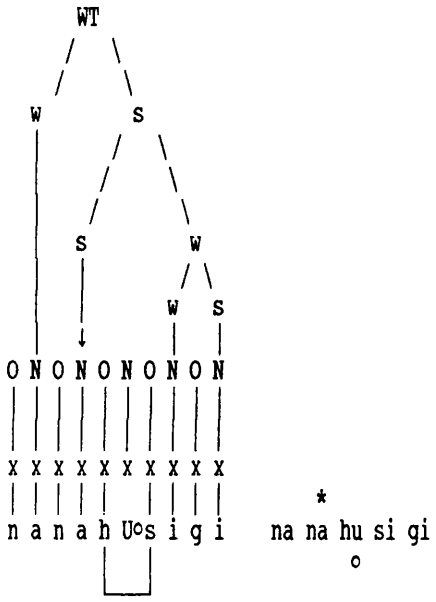
(83) *



In these circumstances, the penultimate foot does not branch, since a p-licensed nucleus cannot be projected to the nuclear projection. Thus the accent falls onto the nuclear position of the

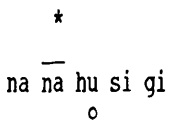
penultimate foot, the preantepenult nucleus.

(84)



The pitch accent is interpreted as high pitch (no sharing of H tone due to the inaccessibility of the domain-initial nucleus):

(85)



As is shown in the derivation above, when the antepenultimate nucleus coincides with a high vowel which is in the environment for non-interpretation, the accent is assigned on the preantepenultimate nucleus.

From this, we can conclude that a p-licensed nucleus cannot be the head of the domain i.e. cannot be an accented nucleus. In other words, an empty nuclear position cannot be the head of the domain.

Another instance of p-licensing preventing a nuclear position from being assigned an accent is found in those words involving geminate consonants.

3.3.2.4. Geminate consonants and accent assignment

Consider the following words, which contain geminate consonants, and note that a geminate may bear a pitch:

(86)a.

ba t ta

'grasshopper'

b. *

to no sa ma ba t ta

'locust'

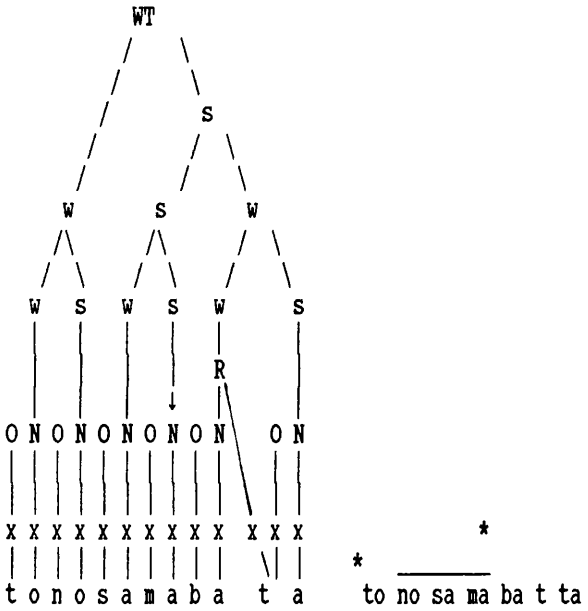
c. *

ge N go ga k ka i

'Linguistic conference'

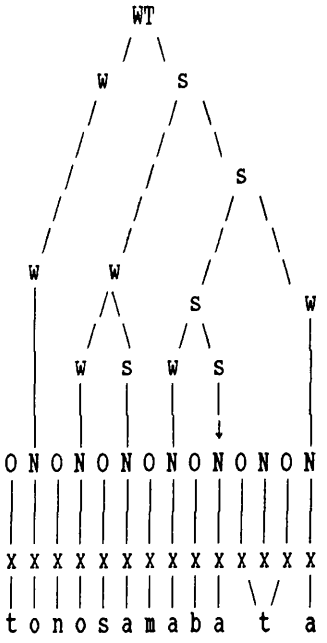
As I explained in Chapter 1 (1.2.2.3), this accent assignment process reinforces the newly established structure of a geminate in Standard Japanese. The fact that a geminate consonant may bear a pitch, as perceived by native speakers, indicates that a geminate should involve a nucleus. The standard analysis by Poser (1984) and Abe (1987) et al, in which a geminate is syllabified as a rhymal complement, cannot explain the fact that a geminate may be realised with a pitch. In direct opposition to that, the accent assignment analysis I present in this chapter attests that a geminate involves two onset positions flanking an empty nuclear position. If we had chosen to employ the standard analysis and syllabify a geminate as a consonant associated to the rhymal complement and its following onset, this accent assignment could not be explained. Suppose the geminates were associated to rhymal complement and onset positions. An accent is assigned on the antepenultimate nucleus (metrical structure omitted):

(87)



As (87) shows (along with the examples presented in 1.2.2.4), the empty nuclear position p-licensed within the inter-onset domain is counted in assigning an accent on the antepenultimate nucleus.

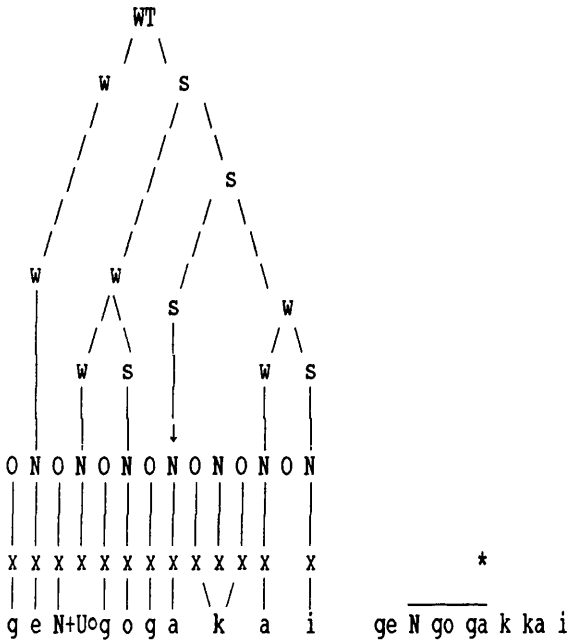
(88)



Thus, a geminate involves two onset positions contracting a licensing relation, and the nuclear position within the domain is p-licensed.

I now turn to the word which has a geminate whose p-licensed nucleus coincides with the antepenultimate nucleus. We have observed so far that a nuclear position which is p-licensed within an inter-onset domain cannot be assigned an accent. This is illustrated by the form in (86c), whose representation I show below:

(89)



The antepenultimate nucleus is p-licensed and is not projected to the nuclear projection. Thus, the accent of the word cannot be assigned on the nucleus in question. The nucleus within the penultimate foot becomes the head of the domain, and is therefore accented.

3.4. Conclusion

In this chapter, I have demonstrated how a pitch accent language, Standard Japanese, can also be regarded as a stress language. The main discussion shows how the principles and parameters account for pitch accent phenomena in morphologically simplex forms. The subsections of 3.3.3 discuss what my proposal in 3.2 predicts in terms of pitch accent assignment, without stipulating extra rules for each individual phenomenon.

In the following chapter, I discuss morphology. The analysis presented in Chapter 3 is extended to account for morphologically complex forms, such as compound nouns, and noun/case-marking particle sequences.

Chapter 4

Morphology and Pitch Accent

4.0. Introduction

In the previous chapter, I have discussed how pitch accent and high pitch are assigned to lexical items without internal structure. This section discusses the morphological interaction under a syntactic atom, N^0, where N represents nouns, and the way in which these nouns are suffixed by other morphemes, i.e. case-marking particles and tense morphemes. For the purposes of my discussion I focus on nouns, i.e. noun-noun compounds[1], and sequences of nouns with case-markers. Since my discussion in this section deals with how the phonology (pitch accent phenomena) interacts with morphological structure, I shall outline the theory of the phonology-morphology interface (Kaye 1993, Kaye & Vergnaud 1990) as my starting point.

4.1. Morphology and Licensing

In this section I will show how Kaye & Vergnaud (1990) and Kaye (1993) discussed stress assignment in English 'compounds' (I refer to a juxtaposition of more than one word, as a compound). The nucleus bearing primary stress in a word is the head nucleus of that word (domain).

4.1.1. Non-analytic morphology

As I have already explained in section 3.2, there is a class of words whose members behave as if they were single domains with no internal structure, even though they are constructed from more than one lexical item (e.g. nouns). In one class of English words, stress is assigned to the

[1]I exclude compounds which involve deverbal nouns, whose system of accent assignment may differ from other compounds. The reason I avoid those compounds is that, as I discussed in Chapter 2, when a verb is nominalised and changes its grammatical category, there is an extra morphological (phonological) process which deserves independent study (see also Kubozono 1988).

phonetically interpreted antepenultimate nucleus of the word (Kaye & Vergnaud 1990)[2].

(1) américa
cínema
aspáragus
cápital

Also, in one type of concatenated word which behaves as if it were non-analysable, the stress assignment is identical to that of a morphologically simplex word. For example, let us take the following words:

(2) a. kilo + meter --> kilóměter

b. blue + berry --> blúeběrry

In words such as those in (2), stress is assigned to the antepenultimate nucleus, as if the word had no internal morphology. In those forms, stress is assigned regardless of the stress of either morpheme A or B. This type of word is claimed to have non-analytic structure (Kaye & Vergnaud 1990), in which the morphemes A and B behave as if they formed a single word with no internal structure.

(3) A + B ---> [A B] *[[A][B]]

The question then arises as to how stress is assigned in a compound in which [A] or [B] (or both) constitutes a domain e.g. [[A]B] and [[A][B]], unlike the non-analytic [A B] structure.

4.1.2. Analytic compounds

Consider the concatenation of terms A and B, i.e. domains [A] and [B]. Since both the terms constitute domains by themselves, this operation is a juxtaposition of two domains, [A] and [B]. Both the terms A and B constitute domains within which phonological operations, such as stress assignment, can proceed. Stress assignment is subject to the Licencing Principle (Kaye 1990a) in the theory of

[2]This only refers to nuclei which are unlicensed, therefore a domain final empty nucleus, which is licensed in English, is excluded for the purposes of stress assignment, i.e. it is not projected to metrical structure.

government, as are all other phonological processes.

(4) **Licensing Principle**
All phonological positions save one must be licensed within a domain. The unlicensed position is the head of this domain.

The domain A has its head nucleus, the stressed nucleus. B also has one stress, born by the head nucleus of the domain.

Consider, then, a domain AB as a compound [[A][B]]. There are two head nuclei in the domain AB: one from the domain A, and the other from B. Word stress is assigned to the head nucleus of the domain. In accordance with the Licensing Principle, there is only one head nucleus in a domain: only one primary stress can be assigned. In English, if the compound noun has an analytic structure e.g. [[A][B]], the stress of the left-most domain is projected as the primary stress of the compound (Kaye & Vergnaud 1990). I offer an example:

(5) super + man --> [[súper][mán]] súpermàn

The 'súpermàn' type of stress assignment is derived from the internal structure [[A][B]]. In this structure [[A][B]] there are three domains: domain A, domain B and domain AB. Domain A, as well as domain B, must have a head nucleus which bears stress. In súpermàn, both domain A [super] and domain B [man] bear stress. When the two domains are juxtaposed to form the word domain AB, the primary stress is projected from the left-most domain to become the primary stress of the word. The stress of domain B [man] is inherited by the word as the secondary stress.

By way of another example, in (6), póstmăn has primary stress only, without a secondary stress. The difference between súpermàn and póstmăn comes from the fact that man constitutes a domain in súpermàn but not in póstmăn, [[A][B]] vs. [[A]B].

(6) post + man --> [[póst]man] póstmăn

In the word, the primary stress is inherited from domain A. The word póstmăn has the morphological structure [[A]B]. This means that there are two domains in the word, namely, domain A and domain AB. Following the Licensing Principle, domain A has to have a head position, which is a nucleus bearing stress. One stress is assigned to [post] in [[póst]măn]. Now consider the domain, AB. The stress of domain A, that of post is projected to the word level as the primary stress. Unlike the [[A][B]] structure, in [[A]B], B is not an independent domain and so lacks a head nucleus bearing stress, and accordingly, no stress is inherited from B.

So far, two kinds of morphological structure have been discussed, analytic and non-analytic. (7) provides an example of a compound that has two alternative morphological structures.

(7) altímĕter [alti+meter] (American English)
altìmèter [[alti][meter]] (British English)

The word altimeter is pronounced as altímĕter in American English and altìmèter in British English. Kaye & Vergnaud (1990) claim that the form altímĕter results from a non-analytic structure [A B], whereas altìmèter is derived from an analytic [[A][B]] structure. As in American English, if the form altimeter has non-analytic structure, the word is treated as a non-analysable unit. Then the antepenultimate nucleus is the stressed nucleus. On the other hand, form altìmèter (British English) is derived from the analytic form [[A][B]] in which the stress of the left-most domain, the head of the compound, is projected as the primary stress. The stress of domain B is inherited as the secondary stress. The forms altímĕter and altìmèter are thus derived from the structure [altí+meter] and [[álti][méter]] respectively.

As I will discuss in detail below, this morphological analysis plays a crucial role in the accent assignment of morphologically complex forms in Standard Japanese, similar to its role in English compound stress assignment.

4.2. Compound Accent

4.2.1.1. Pitch accent and stress assignment in compounds

- A comparison of Standard Japanese and English -

As I discussed in Chapter 3 (3.2.3), my claim is that the formalism of pitch accent assignment in Standard Japanese and of primary stress assignment (e.g. in English) are identical. The discussion in 3.2.3 is based on the tenet that the location of stress/accent is predictable unless it is lexically specified, as is the case with all other phonological information. In this section, I demonstrate how pitch accent assignment in Standard Japanese and stress assignment are accounted for by the same formalism, from the point of view of how stress/accent is assigned to a morphologically complex form.

Accent assignment in Standard Japanese pursues the same formalism as primary stress assignment in stress languages, in that only one accent is assigned no matter how the domain expands by morphological operations. As I outlined in 4.1.2, only one primary stress is assigned to a word, and other nuclei have a lesser degree of prominence[3] (Charette 1991). The fact that only one accent/stress is assigned in a domain follows directly from the Licensing Principle (Kaye 1990à):in a domain there is only one head. All the nuclear heads in a (word) domain have to be licensed by the head nucleus. So when a domain consists of more than one morpheme, the domain may have more than one lexical marking, if the morphology is analytic. In other words, the lexically marked nuclei, the heads of the nested domains, are in conflict with respect to which of them should assume the role of head of the external domain.

In the next section, a contrast between English stress and Standard Japanese accent is discussed, with the focus on how grammatical categories of morphemes affect stress/accent assignment.

---

[3]It is important to note that stress assignment (e.g. in English) and Japanese pitch accent assignment differ in the respect that there is secondary stress but there exists no secondary pitch accent. In addition, in Japanese pitch accent phenomena, the accent is interpreted as a high pitch which is shared by nuclei to the left except for the inaccessible domain-initial nucleus; whereas in the stress system, the head is stressed while the others, the licensed nuclei, are not. Nonetheless, the assignment of accent and primary stress are identical in the way they resolve stress/accent conflicts in a given domain.

4.2.1.2. Grammatical category and stress/pitch accent

Like English stress assignment, accent assignment in Standard Japanese is sensitive to the way in which the morphemes involved are related syntactically. My argument is based on the fact that both stress and accent assignment are sensitive to phrasal and compound structure. Let us look at English stress assignment, which is sensitive to the syntactic relations between morphemes. In a configuration $[_C A\ B_C]$, i) if C is a phrasal category, the primary stress within domain B is strong, ii) if C is a lexical category, the primary stress of B is strong if and only if it branches (if at any stage of the compounding process B is itself a compound form) (Liberman and Prince 1977). For example, consider stress assignment in blàck bírd and bláckbìrd.

(8) a. [[blàck][bírd]] (a bird which is black)

b. [[bláck][bìrd]] (turdus merula)

In a phrase like (8a), the primary stress is assigned to bird. If the external domain is a lexical category, the stressed vowel of A is assigned the primary stress in the compound[4] (8b), because B does not branch. Now consider an example from Japanese, which identifies the relevant syntactic distinction equally well:

[4]By the term compound I mean a juxtaposition of morphemes which has the structure [[A][B]]. Note that I exclude the case discussed in Chapter 3 (3.2.6.2), that of a non-analytic concatenation [AB] in which the morphemes behave as if they together form a non-analysable domain without internal structure.

(9)a.i)

```
          *        *              *   (*)
        a o i  +  mi do ri  -->  a o i mi do ri
```

'blue (adj)' 'green' 'blue-ish green'

ii)

```
          *        *           (*)  *
        a o  +   mi do ri  -->  a o mi do ri
```

'blue(n.)' 'green' 'emerald green'

b.i)

```
          *        *             *  (*)
       na ga i  +  a me    -->  na ga i a me
```

'long(adj)' 'rain' 'long rain'

ii)

```
          *        *             (*) *
       na ga   +  a me    -->  na ga  a me
```

'being long' 'rain' 'a spell of wet weather'

As the Japanese examples in (9) show, there is no ambiguity with respect to the adjectival vs. nominal forms, because of the adjective ending -i. Therefore it is not only accent assignment that may determine whether a word is a compound or a phrase. Nevertheless, accent assignment is sensitive to the grammatical category of the morphemes[5], exactly like stress assignment in English. Note that the choice of domain head in English is a mirror image of that in Japanese (McCawley 1977): a) English compound stress is head-initial, and phrase stress is head-final, whereas b) Japanese compound accent is head-final[6], and phrasal accent is head-initial.

---

[5]See also Kubozono (1988) for a discussion on compound-phrase structure distinction.

[6]Although limited to a certain type of word, there is a class of compounds which demonstrates phrase type accent assignment. Kubozono (1987) discusses thoroughly the semantic and syntactic constraints on the classification of compounds: I shall only refer to one type since my analysis involves the compounds which do not follow the left-most accent principle i.e. that of Phrase accent assignment. The following set of data illustrates how a pitch pattern is assigned to a surname plus status/title:

Accent assignment in phrases in Standard Japanese is discussed in Chapter 5, while I devote this section to a discussion of the structure of compound nouns.

4.2.2. Compound nouns

4.2.2.1. Problems

In this subsection, I demonstrate that compound structures in Standard Japanese are right-headed in terms of pitch accent assignment. I begin by discussing the following set of data, which consists of two-term compounds whose accent is projected from the lexical accent of the rightmost term. Following the convention established in Chapter 3, I list the lexical accentuation and pitch pattern of the nouns A and B in the left and middle columns respectively, and those of the compounds in the right column. * on the nuclear segment indicates the lexical accent, while bracketing (*) denotes the accent deleted in the compound.

---

a.	*		*
	ta na ka	ha ka se	ta na ka ha ka se
	'Tanaka'	'Doctor'	'Dr. Tanaka'
b.	*	*	* (*)
	yu ka wa	ha ka se	yu ka wa ha ka se
	'Yukawa'	'Doctor'	'Dr. Yukawa'
c.		*	*
	na ka so ne	so o ri da i ji N	na ka so ne so o ri da i ji N
	'Nakasone'	'Prime Minister'	'Nakasone P.M.'
d.	*	*	* (*)
	ho so ka wa	so o ri da i ji N	ho so ka wa so o ri da i ji N
	'Hosokawa'	'Prime Minister'	'Hosokawa P.M.'

This type of compound resolves conflicting accents in the same way as two concatenated Phrases A and B do, i.e. the left-most accent dominates the domain AB and the other accent is deleted (see Chapter 5 for a detailed discussion).

(10)[7] **NOUN A** **NOUN B** **COMPOUND AB**

a.

```
                *                  *
ta ke   +   ha si      -->     ta ke ba si
```

'bamboo' 'chop sticks' 'bamboo chop sticks'

b.

```
                *                    *
i wa si +   ku mo      -->     i wa si gu mo
```

'sardine' 'cloud' 'fleecy cloud'

c.

```
      *     *                   (*) *
a ta ma +   ka zu      -->     a ta ma ka zu
```

'head' 'number' 'number of person'

d.

```
                *                    *
ha ne   +   ma ku ra   -->     ha ne ma ku ra
```

'feather' 'pillow' 'feather pillow'

e.

```
                *                    *
ko o ri +   ma ku ra   -->     ko o ri ma ku ra
```

'ice' 'pillow' 'ice bag (pillow)'

f.

```
*               *              (*) *
ki      +   mi do ri   -->     ki mi do ri
```

'yellow' 'green' 'yellow-green'

---

[7]Some readers may note the fact that some of the compounds in this set of data have an alternative accent assignment i.e. on the antepenultimate nucleus of each form in question. In order to simplify the present discussion, I shall postpone any discussion of such possibilities until a later section (4.2.2.6).

[8]I am aware that in some of the compounds, we observe a phonological process known as 'sequencial voicing'. This process changes the 'voiceless' consonants /k,s,t,h/ into their 'voiced' counterparts /g,z,d,b/, when a non-initial member of a compound begins with one of the 'voiceless' consonants above, in isolation. For example, in take + hasi the word initial consonant h becomes b in the compound takebasi.

g.

```
*          *              (*)  *
a o    +   mi do ri   -->     a o mi do ri
'blue'     'green'            'blue-green'
```

h.

```
                *                    *
sa sa  +   mi do ri   -->     sa sa mi do ri
'bamboo grass'  'green'       'green of bamboo grass'
```

i.

```
 *            *              (*)   *
zi     +   ta ma go   -->     zi ta ma go
'natural being'   'egg'           'free-range egg'
```

j.

```
 *            *              (*)      *
na ma  +   ta ma go   -->     na ma ta ma go
'state of being raw'  'egg'          'fresh egg'
```

k.

```
                *                    *
ka ni  +   ta ma go   -->     ka ni ta ma go
'crab'     'egg'              'crab omelette'
```

l.

```
                *                        *
u zu ra + ta ma go    -->     u zu ra ta ma go
'quail'    'egg'              'quail egg'
```

m.

```
                *                    *
fu ji  +   mu ra sa ki  -->   fu ji mu ra sa ki
'whisteria'   'violet'        'whisteria violet'
```

n.

```
    *          *              (*)      *
ya ma  +   ho to to gi su  --> ya ma ho to to gi su
'mountain'    'cuckoo'        'mountain cuckoo'
```

The compound nouns in (10) reflect the lexical accent of noun B, whether noun A is accented or not. In other words, the location of the accent in noun A does not affect the accent assignment of the compound noun. Most of the examples of this type of compound, such as those in (10d-n) above, adhere to the following Compound Accent Rule (McCawley 1977:272):

(11) Compound Accent Rule

> In a compound noun $[_N A\ B_N]$ where B_N is three or more morae long[9], the accent of B_N predominates as the compound accent (i.e. the accent of A_N is eliminated)

Examples (10j) namatamago and (10l) uzuratamago provide a good illustration of accent assignment in this type of compound. In both, noun B tamago is lexically accented on the second (that is, penultimate) nucleus. As for noun A, nama is lexically accented on the initial nucleus, whereas noun A uzura is a lexically accentless noun. In both forms, regardless of the lexical accentuation of noun A, the lexical accent of noun B is reflected in the compound accent. The rule adequately describes the mechanism of accent assignment, but does not explain how this class of concatenated forms conforms to the rule in (11). Moreover, the rule restricts the class of compounds to those whose Noun B is three 'morae' or longer (three OR pairs or longer), and thus fails to categorize the nouns labelled B in the examples in (10abc), which consist of only two 'morae'[10].

Accordingly, I shall give an account of how the lexically marked nucleus of noun B, the rightmost term, is deemed to be the head nucleus in a compound structure.

---

[9]Using my terminology, 'three or more morae' is interpreted as containing three or more nuclei.

[10]To be fair to McCawley's analysis, I note that he postulates an extra rule to accommodate examples such as those in question (see also Chapter 2). However, my proposal does conflate the two separate groups into a single class, and offers an explanation of how they are assigned accent.

4.2.2.3. Proposal of right-headedness in category projection N^0 in Japanese

The purpose of this section is twofold. The first task is to propose that accent assignment in compound nouns within the category projection N^0 (i.e. without case-marking particles), which reflects the accentuation of subconstituents, is derived from the kind of morphological organisation termed analytic (4.2.2), as opposed to the non-analytic concatenated nouns discussed in Chapter 3 (3.2.6.2). The other purpose of this section is to extend right-headedness, proposed by Williams (1981) in derivational affixation, to a lexical derivation process, namely that of pitch accent assignment in Standard Japanese.

So far, I have been emphasising that English stress assignment and pitch accent assignment in Standard Japanese are identical. However, at the same time, I mentioned that in Japanese the choice of head nucleus is a mirror image of the English case. I shall demonstrate that, unlike English stress, Japanese pitch accent phenomena reflect right-headedness in compound structure.

Williams (1981) proposed that the rightmost constituent is the head of a morphologically complex word, where the head of a word is defined such that the head of X has the same properties (distribution, etc) as X.

(12) If both X and the head of X are eligible members of category C, then

X∈C ≡ head of X∈C (Williams (1981: 247))

For example, in English, generally a suffix (the righthand member) determines the word category of an item of which it forms a part. I cite an example from Williams (1981):

(13) X-ism --> N X-ise --> V X-ish --> A

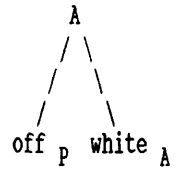
V-ist --> N X-fy --> V

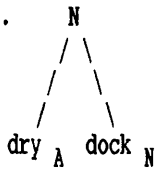
V-ion --> N

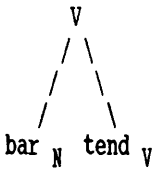
V-er --> N

A-ness --> N

In contrast, the lefthand member, which never occupies the head position (righthand position), cannot be assigned to a lexical category, and a similar situation holds for compounds:

(14) a. 

b. 

c. 

The rightmost member determines the category of the whole[11], thus, the rightmost constituent is the head (Williams 1981).

Note, however, that English stress assignment does not conform to this righthand head rule, as exemplified in the stress assignment of bláckbòard, which percolates up the stress of the left hand member to the compound stress i.e. [[bláck][bòard]]. This is always true unless the right hand member is itself a compound form at any stage of the compounding process (4.2.1.2).

Unlike English, Standard Japanese respects right-headedness in the pitch accent assignment of a morphologically complex word. To demonstrate this right-headedness, I begin by introducing the morphological structure of the compound nouns listed in (10).

4.2.2.4. Analytic compounding and right-headedness

In the case of the Analytic compound AB, both of the elements A and B constitute individual domains [[A][B]]. Accent assignment in an analytic compound is the same as primary stress assignment e.g. in superman: the lexical information of the subconstituents is projected to the compound (4.1). As is the case with stress assignment (and all other phonological processes too), pitch accent assignment is subject to the Licensing Principle (Kaye 1990a) (4.1.2).

In uzuratamago, the lexical accent of tamago is the only lexical marking found in the domain AB. Thus, this case is straightforward: the lexically marked nucleus, that of tamago, becomes the head of the compound domain.

[11]See Williams (1981) for exceptional cases, which I do not discuss here.

(15)

```
                *                       *
[uzura] + [tamago]    --->  [[uzura][tamago]]
```

The penultimate nucleus, which is accented, is the head of the compound domain uzuratamago. As I discussed in 3.2, the accent is interpreted as high pitch, which is shared by the nuclei to the left, except for the inaccessible domain-initial nucleus.

(16)

```
          *
       _________
u zu ra ta ma go
```

Thus, the accent is assigned and the pitch pattern of the compound is derived accordingly.

Turning to namatamago, the compound noun involves two lexically accented terms: nama 'raw thing' and tamago 'egg'. (17) illustrates the pitch pattern of namatamago: the form is high-pitched up to the penultimate nucleus, except for the initial nucleus.

(17)

```
*          *          (*)       *
[na ma] + [ta ma go] --> [[na ma][ta ma go]]

                      (*)       *
                       _________
                      na ma ta ma go
```

The pitch pattern shows that the lexical accent of the right hand term (noun B) is projected to become the accent of the compound.

If, in a domain AB, the lexical accent of domain B is the only lexically marked nucleus, the nucleus may become the head in the compound structure, subject to the condition I discussed in 3.2.6.2. As has been argued in 3.2.6.2, such analytic compounds always have a lexically accented righthand term, noun B; if accentless, the domain of term B has no lexical marking to percolate up to the compound word (see also 3.2.6.2 for the concatenation of term B which is accentless). But if the other term is also lexically accented, then there exists more than one lexically marked nucleus in one concatenated domain: only one marked nucleus can be chosen as the head of the external domain; and in Standard Japanese, the right-most head nucleus, the lexically marked nucleus, becomes the compound head.

(18)

```
                                        (*)      *
     *         *          (*)     *              _____
[nama] + [tamago]  --> [[nama][tamago]]   na ma ta ma go
```

The lexical accent of domain A is deleted in a compound structure.

Compound accent assignment takes place as described above. For the head nucleus of the domain [tamago] to license all the other nuclei, the lexical marking of the other domain [nama] has to be deleted. Then, a high pitch, which is the interpretation of the pitch accent, is assigned to all the nuclear positions to the left of the head nucleus excluding the inaccessible domain-initial nucleus (3.2.4).

I have observed that the words listed in (10) are analytic compounds. We also observed that in pitch accent assignment, the righthand member is the head constituent in compounds. I would like to pursue the question of how this headship plays a role in compounding, where a compound and another term are concatenated.

4.2.2.5. Right-headedness and access to morphological composition

Having assumed right-headedness in pitch accent assignment, I should expect the following implication: only the feature, i.e. lexical marking, of the head constituent is projected to the output of the concatenation.

Sato (1989) points out that in Standard Japanese, compound nouns do not refer to the syntactic relation between the constituent terms. I shall show that the examples of 'compound' chosen by Sato are those types which show non-analytic morphology, in which all the constituent terms are concatenated as if they formed a single word without internal structure. I attach bracketing to show the constituent structure of the terms in question; however, in this paragragh, the bracketing does not represent my formal morphological analysis. For example, hiraisogani[12] 'flat seashore crab' is derived from a combination of hira 'flat', iso 'seashore' and kani 'crab'. The logical constituent structure is [[hira][[iso][kani]]], meaning a seashore crab which is flat. Note that Sato employs

[12]Note that due to 'sequencial voicing' (see footnote 8), the word-initial 'voiceless' consonant k of kani changes to g, when the term is a non-initial member of a concatenation.

the accentuation rule of McCawley (1968), to assign an accent on the final vowel of the left hand constituent when the rightmost term consists of two 'morae', but on the initial vowel of the leftmost term if the latter term consists of three or more 'morae'. To avoid assigning an accent on the initial vowel of isogani, which is expected in hira + isogani, in accordance with the rule of assigning accent on the initial vowel of the rightmost term which is three or more morae long, Sato claims that this constituent structure is not respected in accent assignment. The accented vowel is the final vowel of the left hand term, that is, the antepenultimate vowel of the form hiraisogani. To place the accent on the vowel in question, he points out that the concatenation of the term kani should be carried out as the final operation, after hira and iso are concatenated [[hira][iso]]+[kani]. kani is two 'morae' long and the compound rule places the accent on the final vowel of hiraiso, the left hand term in [[[hira][iso]][kani]]. However, hiraisogani does not have the constituent structure [[hira][iso]]+[kani], which would mean 'a crab on a flat shore', a departure from the original meaning: 'a seashore crab which is flat'.

As discussed in Chapter 3 (3.2.6.2), a non-analytic word without a lexical accent is assigned an accent on the antepenultimate nucleus. I suggest that hiraisogani is a non-analytic word, in which hira, iso and kani are combined to form a single word without internal structure. The term in question is stored as a lexical entry, without any lexical accent. Thus the accent is assigned to its antepenultimate nucleus (3.2.6.2).

I shall show some examples here to demonstrate that Japanese pitch accent assignment in compounds respects constituent structure. As I have shown in 4.2.2.3, pitch accent assignment in Japanese reflects right-headedness: Y (compound) reflects the lexical marking of the head of Y, which is the right-hand member. Then we predict that in the compounding of term X to a compound Y, only the marking realised on Y (which is percolated up from the head of Y) should be interpreted. Following Williams' Atom Condition on affixation, I shall extend this to a lexical derivation of pitch accent assignment in Standard Japanese.

(19) The Atom Condition

> A restriction on the attachment of af_X to Y can only refer to features realised on Y. (Williams (1981: 253))

I demonstrate that Japanese pitch accent assignment does not reflect any lexical marking of the non-head constituent, the left hand member: in other words, the accent assignment respects the Atom Condition (Williams 1981) cited in (19). I shall consider several two-term compounds of which one term is itself a compound. I show the compounding of the constituent term under the heading of i), and the compounding of the result of i) and another term under ii) in each group in (20ab).

(20) **TERM A** **TERM B** **COMPOUND**

a. i)

*	*	(*) *
[oo]	[mu gi]	[[o o][mu gi]]
'big'	'wheat'	'barley'

ii)

*	*	(*) *
[o o mu gi]	[wa ra]	[[o o mu gi][wa ra]]
'barley'	'(rice) straw'	'barley straw'

b.

*	*	(*) *
[mu gi]	[wa ra]	[[mu gi][wa ra]]]
'wheat'	'(rice) straw'	'wheat straw (hat)'

*	*	(*) *
[o o]	[mu gi wa ra]	[o o mu gi wa ra]
'big'	'wheat straw (hat)'	'big wheat straw (hat)'

In the examples above, the output forms have the same accentuation, although they are derived from different constituent structures. In the case of [[[oo][mugi]][wara]] 'straw of barley' in (20a), the term A oomugi 'barley' is a compound, to which the lexical marking of the right hand member is projected. In the compounding of oomugi and wara, the lexical marking of the right hand member is allowed to percolate up, thus the compound accent is on the penultimate nucleus. [[oo][[mugi][wara]]] 'big wheat straw (hat)' is a compound of oo and mugiwara 'wheat straw (hat)': the term B mugiwara is

a compound, to which the lexical marking of the righthand constituent may percolate up. In the compounding of oo and mugiwara, the accent of the compound mugiwara is projected to the form oomugiwara, thus the accent is located on the penultimate nucleus.

Accent is assigned to a compound word by allowing the lexical marking of the righthand member to percolate up through the representation. The examples above resulted in the same accent location in spite of two different constituent structures. In these examples, it is not really clear whether pitch accent assignment is referring to constituent structure or not. An example below is considered, which shows that when a term X is compounded to Y, where Y is already a compound form, pitch accent assignment only refers to the feature (accentuation) which is recognized on Y:

(21)	TERM A	TERM B	COMPOUND
a.	*	*	(*) *
	[bo ro]	[ki]	[[bo ro][ki]]
	'tatter'	'wood'	'tattered wood'
	*	*	(*) *
	[bo ro ki]	[ku zu]	[[bo ro ki][ku zu]]
	'tattered wood'	'waste'	'small chip of tattered wood'
b.	*	*	(*) (*)
	[ki]	[ku zu]	[[ki][ku zu]]
	'wood'	'waste'	'small chip of wood'
	*		(*) *
	[bo ro]	[ki ku zu]	[bo ro ki ku zu]
	'tatter'	'small chip of wood'	'tattered small chip of wood'

kikuzu (21b) is not an ideal example, because the word seems to present counter evidence to my right-headed analysis, since this concatenation results in an accentless word (the morphology of which, at the moment, I cannot fully account for and thus must postpone for future research). However, for the time being, I employ this example, which at least demonstrates that the compounding of X and Y does

not have access to features of the constituent within X or Y.

The accent assignment of (21a) is exactly the same as that of [[[oo][mugi]][wara]]. The lexical accent of the righthand member is projected to the output, that of [ki] in [[boro][ki]], and that of [kuzu] in [[[boro][ki]][kuzu]] 'chip of tattered wood'. However in [[boro][ki-kuzu]], the righthand term kikuzu is accentless, and thus does not have any accent which may be projected. Note that neither the lexical marking of [ki] nor that of [kuzu], the subconstituent of kikuzu, is available in the compounding [[boro][ki-kuzu]]. The righthand term does not have an accent to be projected to the compound: the entire string behaves as a non-analysable string, a non-analytic word, which is assigned an accent on the antepenultimate nucleus. In this manner, the word borokikuzu is treated as a separate lexical item.

4.2.2.6. Compositionality

So far, I have observed how analytic compounds assign pitch accent. As I mentioned briefly in footnote 7, some analytic compounds have alternative accent and pitch patterns, as represented by some of the forms listed in (22):

(22)

	TERM A	TERM B	CONCATENATED PATTERNS (CP)	
			CP 1	CP 2
a.	*	*	(*) *	(*) * (*)
	zi	+ ta ma go	--> zi ta ma go	zi ta ma go
	'being natural'	'egg'	'free-range egg'	
b.	*	*	(*) *	(*) * (*)
	na ma	+ ta ma go	--> na ma ta ma go	na ma ta ma go
	'state of being raw'	'egg'	'fresh egg'	

c.

```
                *                   *            * (*)
    ka ni   +  ta ma go   -->   ka ni ta ma go    ka ni ta ma go
   'crab'       'egg'           'crab omelette'
```

d.

```
                *                     *              * (*)
    u zu ra + ta ma go    -->   u zu ra ta ma go   u zu ra ta ma go
   'quail'      'egg'           'quail egg'
```

I have explained that CP 1 is derived from the analytic structure [[A][B]]. Note that CP 2 has an accent on the antepenultimate nucleus just like non-analytic forms. Two alternative accentual and pitch patterns of such words are derived from different morphological structure, as in English stress assignment, [altíměter] (American English) and [[álti][mèter]] (British English) (4.1.2).

Similarly, the alternating accentual and pitch patterns of the Japanese examples are derived from two different morphological structures. When the operation of word formation results in an analytic string, the accent of the rightmost term is reflected in the compound word accent, resulting in CT 1 forms. But if the word is a non-analytic lexical unit, then the accent is assigned on the antepenultimate nucleus of the word (3.2.6.2).

In the case of the English example [altíměter] and [[álti][mèter]], which is subject to geographical variation, a distinction is made between American and British English based on non-analytic vs. analytic morphology. There are some examples in which the stress assignment varies according to other, non-geographical factors. For example, both kílomèter and kilóměter are used in England, and must be attributed to idiolectal differences. The Japanese examples above also allow similar variation to exist within one geographical area, eg. the city of Tokyo.

There is a clear trend, though, that accent location and pitch patterns are changing from those of CP 1 to CP 2. Roughly speaking, those informants belonging to the group of speakers born after 1960 pronounce the words with CP 2. Nevertheless, the strongest indication of the fact that the accentual and pitch pattern is changing from CP 1, an analytic derivation, to CP 2, a non-analytic

derivation, is that the morphology of concatenated nouns is becoming less compositional. Let me take one of the example in (22b) to illustrate the trend:

(23)a. Derivation of CP1

```
        *                    *            (*)        *
       ‾                    ‾                    ‾‾‾‾‾‾‾‾
    [ na ma ]     +     [ ta ma go ]  -->  [[na ma][ta ma go]]
'state of being raw'        'egg'          'fresh egg'
```

b. Derivation of CP2

```
        *                    *            (*)      * (*)
       ‾                    ‾                    ‾‾‾‾‾‾
    [ na ma ]     +     [ ta ma go ]  -->  [na ma   ta ma go]
'state of being raw'        'egg'          'fresh egg'
```

The older generation employs the compositional form, i.e. the word is treated as a compound form, whereas younger generation speakers store the word as a separate, non-analytic lexical item.

4.3.0. On Noun/Particle Sequences

In the previous section the focus of discussion was accent and high-pitch assignment in a compound word. In this section, I shall consider the phonological and morphological status of Case-marking particles.

4.3.1. The noun and Subject marker, -ga

To begin, I refer to a set of data illustrating the particle -ga, the Nominative Case-marker. The pitch patterns of nouns plus the other particles[13], such as -wa (a Topic marker), -o (the Object/Accusative marker), -ni (the dative, agentive, causative marker, or indication of intended goal or target), and -de (the instrumental, locative marker, or indication of degree or reason) are identical to those of nouns plus the particle -ga. In this thesis, I refer to the sequence of noun and particle using the term 'Phrase', which is employed frequently in Chapters 4 and 5.

(24) CLASS 1 Accent on the initial nucleus

```
      *
      ‾‾
a.  n a m i d a   'tear'

      ‾‾
b.  n a m i d a g a
```

(25) CLASS 2 Accent on the second nucleus

```
        *
        ‾‾
a.  t a m a g o   'egg'

        ‾‾
b.  t a m a g o g a
```

[13]The Genitival nominaliser -no, the Genitive -no, and the appositive -no behave differently from the particles mentioned above, and they are discussed separately in later sections.

(26) CLASS 3 Accent on the final nucleus

```
          *
        ______
a.  t a k a r a   'treasure'

        ______
b.  t a k a r a g a
```

(27) CLASS 4 Accentless

```
a.
        _____
    k u r u m a   'wheel'

b.
        _________
    k u r u m a g a
```

In the data above, the pitch patterns of nouns (a) in isolation and (b) with the particle -ga are compared. In each set (24), (25), (26) and (27), the pitch patterns of the noun portions are identical. This means that the suffixation of these particles does not affect pitch assignment in the noun portions.

Here I consider how the particles are concatenated to the nouns, with respect to the morphological status of the particles. In the previous chapter, I assumed that the pitch-accent domain is a word, as I repeat and show in (28). Note that the skeletons and constituents are, for convenience, omitted from the representations.

```
(28)a.          b.          c.
      *               *             *
     __              __          _____
   [na mi da]      [ta ma go]   [ta ka ra]
```

To consider suffixation of the particle -ga to the word domains above, several morphological structures are suggested. There are three possible morphological structures, analytic or non-analytic (Kaye & Vergnaud 1990, Kaye 1993):

(29) a. [A] + [B] --> [A B] (Non-analytic)

A and B are joined and behave as if they form a non-analysable word.

b. [A] + [B] --> [[A][B]] (Analytic)

Both A and B have their own independent domains.

c. [A] + [B] --> [[A]B] (Analytic)

A has a domain, and B does not.

Recall the theory of morphology (Kaye & Vergnaud 1990, Kaye 1993) which I outlined in 4.1. Stress assignment as in póstmăn is derived from the morphological structure [[A]B], as opposed to súpermàn, which is derived from the structure [[A][B]]. The latter has secondary stress on man, while póstmăn does not have any subsidiary stress in the word. The lexical stress is projected from domain A of [[A]B], which applies to post in [[póst]măn]:

(30) [[A]B] two domains: domain A and AB

post + man --> [[póst] măn]

I propose the structure (29c) (see also (33)) for the concatenation of a noun and a particle, based on the following two pieces of evidence.

First, if a noun and particle sequence is non-analytic, the string should behave like a morphologically simplex word. Accent is assigned on the antepenultimate nucleus (3.2.2.4, 3.2.6.2). Then, as I have discussed in 3.2.6.2, all the forms in (24)-(27) should have their accent on the antepenultimate nucleus. However, referring to the data in (24)-(27), some of the forms have their accent on the antepenultimate nucleus, but most of them do not and all of them retain the accent that would appear on the uninflected stem. Therefore the noun and particle sequence cannot be viewed as non-analytic.

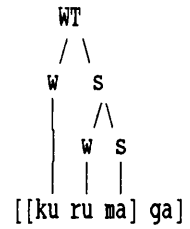
A second possibility is that both a noun and a particle constitute independent domains i.e. [[A][B]]. As I discuss in 4.2.4, this is the morphological structure shown to exist in proper

compounds in Japanese. What I mean by 'proper' is that the compound AB obtains lexical accentual information from the subconstituents, and in Standard Japanese, the lexical accent of the rightmost member, i.e. that of [B] in the compound [[A][B]], is projected as the accent of the compound. If this morphology is applied to a noun and a particle, the lexical accentuation of the particles should be projected as the accent of the noun-particle sequences. Referring to the data, in (24)-(26) the particles are pitchless, whereas in (27), the particle is high-pitched. From the pitch assigned to the particle in each of the sequences in (24)-(27), it can be seen that the Phrase do not inherit the lexical accentuation of the particle: from (24)-(26), since the particle is pitchless, one may say that the particle is accentless, while from (27) one may say that the particle is accented, having a high pitch on the nucleus. In other words, the accentuation of the rightmost member, the particle, is not projected to the domain consisting of a noun and a particle. Thus, the sequence of a noun and a particle can not have the structure [[A][B]].

Before I demonstrate how a noun and a particle are adjoined, I note that the particle -ga is assumed to be lexically accentless in this section (4.3.1). The claim that the particle -ga is lexically accentless is strengthened when it is contrasted with other lexically accented particles, which I discuss in the following section (4.3.2). Thus I postpone any discussion of this claim until (4.3.2).

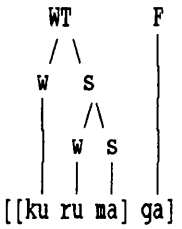
Assuming that the particle -ga is not lexically accented, I show how high pitch is assigned to the examples consisting of a noun and a particle. To begin with, I shall discuss the data involving an accentless noun kuruma. A noun and a particle are joined in an analytic way, i.e. [[A]B]. In the structure [[A]B], there are two domains, i.e. that of A, and that of AB. Phonological processes apply from the inner nested domain, that of A. Following the Licensing Principle, the domain A has a head nucleus. Then, in the external domain AB, there has to be one head nucleus. In an accentless noun, the domain final nucleus is the head of the domain (domain A) (3.2.4.4). When a particle is suffixed, because there is no accented nucleus, the licensing relation between the nucleus of the particle and the nuclei within the noun is head-final.

(31) a.



Feet are built in domain A

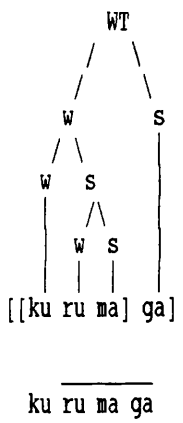
b.



Feet in domain AB

Licensing relations at the nuclear projections are head-final in Standard Japanese (3.2.4.1). The unlicensed nuclei contract licensing at higher nuclear projections. The head, in a word without lexical accent, is the rightmost nucleus (31a). The foot of the particle -ga is adjoined to the metrical pattern organised within the noun domain. Once again, recall that the licensing relation between nuclear positions at the nuclear projections is head-final (3.2.4.1). The foot built on the particle, whose nuclear position is the rightmost one of the domain AB, is incorporated into the metrical tree as a strong member to dominate all the nuclear positions to the left (32). The head nucleus of the domain is interpreted as high-pitched, and the pitch is shared by the the nuclei to the left excluding the domain initial inaccessible nucleus (3.2.4.2).

(32)



ku ru ma ga

In a lexically accentless domain AB ([[A]B]), the head of the domain is the final nucleus, because there is no lexical accent to be projected to the concatenated domain AB.

The situation is different in a sequence of a lexically accented word and the same particle. Recall the Lexical Marking Principle: a lexically marked nucleus is the head of the domain in question (3.2.3). Bearing this condition in mind, I show how a high pitch is assigned to a sequence of a

lexically accented word and particle. Foot construction within the domain A follows from the discussion in Chapter 3: a lexically marked nucleus is the head of the noun domain (domain A).

(33)a. b. c.

```
      *              *              *
[[na mi da] ga]  [[ta ma go] ga]  [[ta ka ra] ga]
```

Recall the following points: i) the head nucleus of a domain, a lexically accented nucleus, is an inherent licenser (3.2.3); ii) the lexical marking of the domain is projected to the concatenated domain AB in the structure [[A]B], as exemplified by the English example postman ([[post]man]) illustrated in (30). As the representations in (34) demonstrate, the lexical accent of the noun (domain A) is projected to the noun-particle sequence (external domain AB). The pitch accent is interpreted as high pitch over the head nucleus and the nuclei to the left (3.2.4.2), except for the inaccessible domain-initial nucleus (3.2.4.3):

(34)a. b. c.

```
   *              *              *
[[na mi da] ga]  [[ta ma go] ga]  [[ta ka ra] ga]

 ‾‾
na mi da ga      ta ‾‾ go ga      ta ‾‾‾‾ ga
                      ma              ka ra
```

In this manner, a high pitch is assigned to the combination of a noun and the particle -ga. The claim that the particle -ga is lexically accentless, which I have just assumed in order to discuss the morphology of noun-particle sequences, becomes clear from the data and analysis of other particles. Below I shall treat the lexically accented particle -no.

4.3.2. On the Genitival -no

4.3.2.1. A lexical property of the particle -no

In this section, I shall discuss the Genitival particle -no, as in the example kuruma-no 'of the car'. The Genitival -no has the effect of nominalising the Phrase. For example, in answer to a question such as 'Which window has been broken?', a response meaning 'One of the car's (not one of

the house etc.) has been broken' is often given in the form of a Genitival Phrase:

(35) kuruma-no. 'The car's.'
car-GEN

Now I shall consider the accentual properties of the Genitival particle. The following set of data illustrates the difference in pitch patterns between the -ga type of particle and the Genitival -no when they follow nouns belonging to various classes of lexical accentuation (36):

(36)a. Lexical accent on the initial nucleus

*
na mi da 'tear'

*
na mi da -ga 'tear-nom.'

*
na mi da -no 'tear-GEN.'

b. Lexical accent on the second nucleus

*
ta ma go 'egg'

*
ta ma go -ga 'egg-nom.'

*
ta ma go -no 'egg-GEN.'

c. Lexical accent on the final nucleus

```
        *
      ____
ta ka ra          'treasure'

        *
      ____
ta ka ra -ga      'treasure-nom.'

       (*)
      _____
ta ka ra -no      'treasure-GEN.'
```

d. Accentless

```
      ____
ku ru ma          'car (wheel)'

      _____
ku ru ma -ga      'car-nom.'

      _____
ku ru ma -no      'car-GEN.'
```

The pitch patterns of noun-ga sequences are identical to corresponding noun-no sequences, with the exception of forms with a finally accented noun (36c); in these cases, the particle -no is high-pitched, whereas the particle -ga is not (36c). Leaving aside the exceptional behaviour of these finally accented words, one may be led to believe that both particles -ga and -no behave in exactly the same way in terms of accent when they are affixed to nouns. However, there is the example in (36c) which suggests that the two particles do not have the same accentual properties.

To pursue an investigation into the difference in the accentual properties of the particles -ga and -no, I focus on the fact that the pitch pattern of takara-no is the same as those sequences consisting of an accentless noun and a particle, kuruma-ga and kuruma-no.

(37) a.
```
     _____
ku ru ma -ga
```

b.
```
     _____
ku ru ma -no
```

c.
```
       (*)
     _____
ta ka ra -no
```

Two ways of interpreting the form in (37c) have been proposed, both of which superficially solve the problem in question, yet neither of which make the correct predictions.

One solution is that in (37c), the accent of the noun 'slides' to the particle (Okuda 1971): the accent on the final nucleus of the noun is attracted to the particle -no.

(38)

	*				(*)->*	
ta	ka	ra	+	no	--->	ta ka ra -no

The pitch pattern of finally accented words are thus derived via this stipulation.

However, a problem arises when we apply the analysis to accentless words. With this accent 'sliding' analysis, although the Genitival Phrase is accented on the nucleus of the particle -no, the noun involved is accentless and thus the source of the accent is unclear. Below, I shall show that a Genitival Phrase behaves like a finally accented noun such as takara. Genitival Phrases are often followed by other particles: e.g. by the nominative marker -ga (Poser 1984), takara-no-ga. As discussed in 4.3.1, the particle -ga is high-pitched only when it follows a lexically accentless noun, and is pitchless when it is preceded by a lexically accented noun. So, if the Genitival Phrase is accented, the particle -ga should be pitchless. The pitch patterns of the Genitival Phrases followed by the Nominative marker are:

(39)a.

		(*)->*		
ta	ka	ra	-no	-ga

b.

		-->*		
ku	ru	ma	-no	-ga

In both forms, -ga is pitchless. Thus, the Genitival Phrases are accented. In (39), nuclei up to that of -ga are high-pitched (except for the inaccessible domain-initial one). Recall that the head nucleus and nuclei to its left receive the interpretation of the pitch accent, high pitch. Therefore, the accent must be on the nucleus of the particle, -no. Note that even when -no follows an accentless noun (39b), the Genitival Phrase is accented on the nucleus of -no. Now, this 'accent slide' analysis

has a problem in accounting for the fact that a sequence consisting of an accentless word and the Genitival particle is also accented (see (39b)). From an accentless word, no accent can be attracted onto the particle -no. In other words, the nucleus of the particle -no must be lexically accented.

An alternative solution would be to consider that the Genitival particle 'deletes' the lexical accent of finally-accented words such as takara, so that they behave as if they are accentless (Haraguchi 1977, Poser 1984). In this way, the lexical accent of a finally accented word is essentially removed when the particle -no immediately follows (see also Chapter 2), with the result that the word behaves like an accentless word, as in (37b). The implication of this solution is illustrated in (40):

(40)

	*				(*)
ta	ka ra	+	no	--->	ta ka ra -no

The pitch pattern of the Phrase is derived. However, there arises the question as to why the accent has to be deleted. Neither Haraguchi nor Poser have addressed this issue. In addition, the crucial problem which the analysis predicts is that the Genitival Phrase has to be accentless, regardless of the lexical accentuation of the noun involved. Since the attachment of -no deletes the accent on the finally accented noun, the Phrase have to behave like accentless phonological string. Then, if the Genitival Phrase is accentless, we cannot explain the pitch pattern in (39): the fact that a Genitival Phrase is accented becomes clear when followed by another particle -ga. I support this accent deletion analysis, but suggest, however, that the lexical property of -no must be made explicit.

In light of the considerations above, focusing on the fact that the Genitival Phrase is accented on the particle -no, I propose that the Genitival particle -no is lexically accented.

(41) Genitival -no is lexically accented.

Having proposed (41), I discuss how a high pitch is assigned to a noun-no sequence. The only accented nucleus in the entire domain is that of the particle -no, in the sequence comprising the lexically accentless word kuruma and -no. Therefore the accented nucleus of the -no particle becomes the head

of the domain AB in [[A]B] (42).

(42)

```
                *
       [[ku ru ma] no]
```

The head nucleus and the nuclei to the left except for the inaccessible domain-initial one receive the high-pitch interpretation of the pitch accent (43):

(43)

```
                *
       [[ku ru ma] no]

                *
          _______
          ku ru ma no
```

In contrast to the combination consisting of an accentless word and -no, there are two lexically marked nuclei present when a lexically accented word and lexically marked particle -no are concatenated.

(44)

```
a.  *       *    b.      *     *    c.         *  *
    [[na mi da] no]     [[ta ma go] no]     [[ta ka ra] no]
```

I have proposed that a noun-particle sequence has analytic morphology [[A]B]. The lexical marking is projected from domain A of [[A]B], as in [[póst] măn]:

(45)

```
      [[A]B]


   post + man  -->    [[póst] măn]
```

The noun portion domain A is the morphological head in Standard Japanese: the lexical accent of domain A, the noun in a noun-particle sequence, is projected to the concatenated domain, AB.

(46)

```
a.  *       (*)  b.      *     (*)  c.         *  (*)
    [[na mi da] no]     [[ta ma go] no]     [[ta ka ra] no]
```

The lexical marking of the particle is deleted. A high pitch, the interpretation of pitch accent is realized on the head nucleus and the nuclei to the left excluding the inaccessible domain-initial nucleus.

(47)a. b. c.

```
      *     (*)        *    (*)          *  (*)
[[na mi da] no]   [[ta ma go] no]   [[ta ka ra] no]

 na mi da no       ta ma go no      * ta ka ra no
```

With respect to the forms which are either initially accented or medially accented, the derived pitch patterns are correct. However, the question arises here as to why only finally-accented words result in the incorrect pitch pattern shown in (47c). Let me focus on a noun which has a lexical accent on the final nucleus. In (48), I repeat the correct pitch pattern of the form in question.

(48)

```
        (*) *
      _______
ta ka ra -no
```

To help discover why a finally-accented word behaves differently from other words which are accented elsewhere, a clue is provided by the fact that the lexically accented nucleus of the noun and that of the particle are adjacent when the noun has its lexical accent on the final nucleus, in reminiscence of STRESS CLASH AVOIDANCE (Liberman & Prince 1977, Nespor & Vogel 1979). It is a widespread and general tendency for languages to avoid representations in which adjacent 'syllables' (in my terms, nuclei) are stressed (Goldsmith 1990).

Accent clash avoidance is one manifestation of the OCP (the Obligatory Contour Principle). OCP (Leben 1973) argues that no identical items are found adjacent at any given autosegmental level. If there are two adjacent lexically accented nuclei at one projection, the environment brings about the operation of OCP. OCP is applied here to show that two adjacent lexically accented nuclei at the nuclear projection produce a conflict. In Standard Japanese, following the head-final nature of licensing relations between nuclei (3.2.4.2), the right-hand accented nucleus licenses the one on the

left. More data on finally-accented words are provided in (49). For reference, the noun with the accentless particle -ga is shown in brackets to illustrate that the nouns are finally-accented rather than accentless.

(49)

a.	*	* (*)	*
	u ta 'song'	u ta -no 'song-GEN.'	(u ta -ga)
b.	*	* (*)	*
	ha si 'bridge'	ha si -no 'bridge-GEN.'	(ha si -ga)
c.	*	* (*)	*
	i nu 'dog'	i nu -no 'dog-GEN.'	(i nu -ga)
d.	*	* (*)	*
	i e 'house'	i e -no 'house-GEN.'	(i e -ga)
e.	*	* (*)	*
	ku mo 'cloud'	ku mo -no 'cloud-GEN.'	(ku mo -ga)
f.	*	* (*)	*
	ti ka ra 'power'	ti ka ra -no 'power-GEN.'	(ti ka ra -ga)
g.	*	* (*)	*
	ka ga mi 'mirror'	ka ga mi -no 'mirror-GEN.'	(ka ga mi -ga)
h.	*	* (*)	*
	o mo te 'face'	o mo te -no 'face-GEN.'	(o mo te -ga)
i.	*	* (*)	*
	hu ku ro 'bag'	hu ku ro -no 'bag-GEN.'	(hu ku ro -ga)

These nouns are all lexically accented on the final nucleus, thus the accented nucleus of the noun

is adjacent to the accented nucleus of the particle -no at the nuclear projection. If the lexically marked nuclei are adjacent, Accent Clash Avoidance (Nespor & Vogel 1979) comes into operation, and the righthand lexical accent remains as the head of the domain in question.

As has been discussed above, the pitch pattern of a Phrase (noun + particle) is derived from the inherent accentual properties of the noun and the particle involved.

4.3.2.2. Word-final nuclear sequences and N [ũ̃ɯ̃]

- In relation to the Genitival -no -

In this section, I shall consider some data involving word final vowel sequences and N [ũ̃ɯ̃]. With respect to so called 'heavy diphthongs', 'long vowels' (in my terms, nuclear sequences) and Vowel-'Moraic nasal' sequences, it seems we must call into question the claim held by Haraguchi (1977, 1991), Poser (1984) et al that such sequences should be analysed as 'mono-syllables'. As I have explained in Chapter 3 (3.3.1.1), a so-called 'heavy diphthong' and 'apparent long vowel' are analysed as two separate nuclei in sequence, and a sequence of a vowel followed by a so-called 'moraic nasal' is not a single unit, but is syllabified into two separate OR pairs (1.2.2.2, 3.3.2.1). The sequences in question are considered once more, this time in relation to morphology, to support the analysis presented in Chapter 3. By observing the pitch patterns of sequences which consist of words whose final positions are occupied by either a nuclear sequence or N [ũ̃ɯ̃], followed by the particle -no, I show that the unit 'syllable' plays no role in accent clash introduced in 4.3.2.1.

Haraguchi (1977) and Okuda (1971) propose that the 'diphthong', 'apparent long vowel' and VN sequence are all 'heavy-syllables' and that the rule to delete the lexical accent of the noun is applied if the lexical accent is on the final 'syllable'. Their claim is based on the following limited set of words which includes ototoi 'the day before yesterday', kinoo 'yesterday' and nihoN 'Japan', which end in a nuclear sequence and a N [ũ̃ɯ̃], respectively.

(50) a.

*	(*) *	*
o to to i	o to to i -no	(o to to i -ga)
'the day before yesterday'	'the day before yesterday-GEN.'	

b.

*	(*) *	*
ki no o	ki no o -no	(ki no o -ga)
'yesterday'	'yesterday-GEN.'	

c.

*	(*) *	*
ni ho N	ni ho N -no	(ni ho N -ga)
'Japan'	'Japan-GEN.'	

In opposition to the claim by Okuda and Haraguchi above, as Poser (1984) points out, accent deletion does not apply to a large number of words whose accent is on the word-final 'heavy-syllable'. I cite some of Poser's examples, which contain a 'heavy syllable' (nuclear sequences or an N [ũ]) in word final position and do not trigger deletion of the noun accent when suffixed by -no.

(51) a.

* * (*)	
sa to o	sa to o -no
'sugar'	'sugar-GEN.'

b.

* * (*)	
ko o hi i	ko o hi i -no
'coffee'	'coffee-GEN.'

c.

* * (*)	
ryu u kyu u	ryu u kyu u -no
'Ryukyu Islands'	'Ryukyu Islands -GEN.'

d. * * (*)

se N se i se N se i -no

'teacher' 'teacher-GEN.'

e. * * (*)

si ke N si ke N -no

'examination' 'examination -GEN.'

f. * * (*)

ta i wa N ta i wa N -no

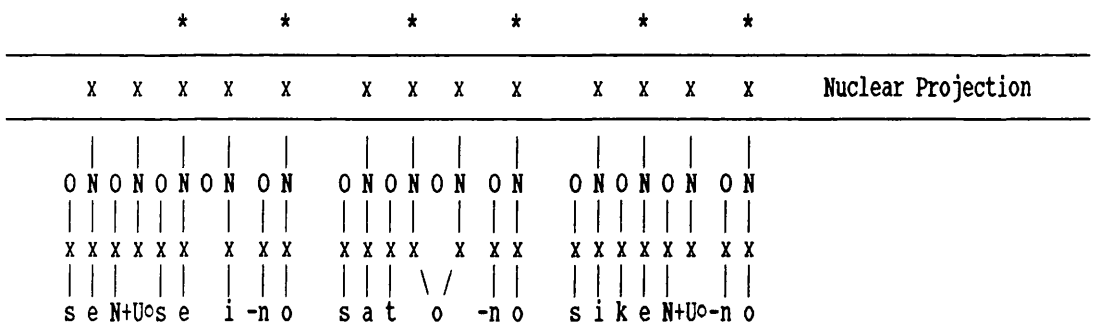
'Taiwan' 'Taiwan-GEN.'

Thus it is inaccurate to claim that a lexical accent on the final 'syllable' is deleted when suffixed by the particle -no. The large number of nouns whose word-final 'heavy syllables' are accented, but which are not subject to noun accent deletion, demonstrate that the nouns in (50), on which the claim by Haraguchi (1977) and Okuda (1971) are based, such as nihoN-no and kyoo-no, which are subject to accent deletion, should be considered true exceptions.

Given the same condition, i.e. that final 'syllables' are heavy syllables and bear lexical accent, the nouns in (50) and (51) do not show uniform behaviour in terms of accent clash avoidance, as discussed in 4.3.2.1. This indicates that the noun accent deletion phenomenon in noun-no sequences does not refer to the question of whether the final 'syllable' is accented or not; in other words this phenomenon must be accounted for without reference to the unit 'syllable'.

The reason why the words in (51) are not subject to accent clash is explained when we observe the location of lexical accents at the nuclear projection. Recall the analysis in 4.3.2.1. We have observed that in a sequence consisting of a lexically accented noun and the particle -no, the accent of domain A (that of the noun) is projected to the domain AB, unless the word of domain A is accented on the word-final nucleus. In the examples in (52) below, there are two lexical markings in the domain AB of the structure [[A]B].

(52)a. se N se i -no b. sa to o -no c. si ke N -no

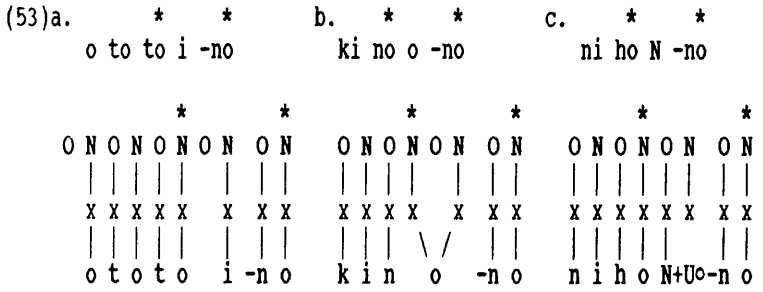


Here, lexically accented nuclei are never adjacent at the nuclear projection, and the words in question are not subject to accent clash avoidance.

As already noted, an exception to this pattern is provided by the group of words illustrated by (50). If we were to employ the notion 'heavy syllable' as was adopted by Okuda and Haraguchi, the accents of the words are located on the final 'syllable'. And if the unit 'syllable' were to be respected by phonological processes such as accent clash avoidance, the accent of the word and the particle -no would be adjacent, this environment inducing accent clash avoidance (4.3.2.1). However, it is not plausible to accept that this 'syllable' takes on an important role only in those exceptional cases.

Denying the 'syllable' as an active unit involved in accent clash avoidance, I must provide an alternative account to explain why words in (50) are special in terms of accent clash. Following my analysis so far, the examples in (50) all have their lexical accent on a non-final nucleus, and are thus expected to conform to the pattern in which the accent of domain A is projected to the domain AB. However, accent clash (4.3.2.1) does indeed occur in the examples in (50): the accent of the particle -no ultimately proves to be stronger, as is the case when the words involved have their lexical accent on the final nucleus. I show the representation of the words below.

(53)a.



b.

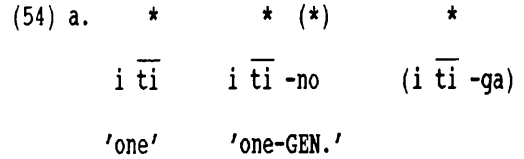
c.

We may observe that the accent is not on the word-final nucleus and that the lexically marked nuclei are not adjacent in (53abc). Words such as those in (50) are exceptions, and thus must carry lexical information in order to bring about noun accent deletion.

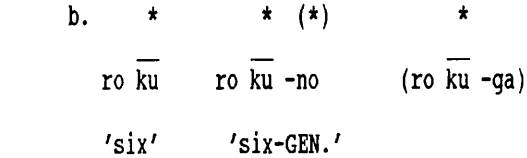
The following offers a potential solution to the question of why the words in (50) are subject to noun accent deletion, as if the lexical accent were adjacent to that of the particle -no. As Poser (1984) points out, some nouns such as those listed in (50) contain lexically encoded information which activates noun accent deletion when the form is suffixed by the particle -no.

Furthermore, this lexical solution is supported by the following set of data (Poser 1984). I modify the data in accordance with my own analysis of the Genitival particle, i.e. the particle is marked with *, following my claim that it is lexically accented (see also Chapter 2 for an outline of the analysis by Poser (1984)). I have explained that the two adjacent nuclear positions which carry lexical marking induce accent clash, and as a result, the lexical marking on the left is deleted (4.3.2.1). The set of data below demonstrates that there are exceptions: even though the two lexically marked nuclei (that of the noun and the particle) are adjacent, some nouns always retain their lexical accent, deleting the accent of the particle instead.

(54) a.



b.



c. * * (*) *

ha ti ha ti -no (ha ti -ga)

'eight' 'eight-GEN.'

d. * * (*) *

tu gi tu gi -no (tu gi -ga)

'next' 'next-GEN.'

e. * * (*) *

yo so yo so -no (yo so -ga)

'external entity' 'external entity-GEN.'

As the above words in (54) show, accent clash avoidance is not induced by the sequence of any of the word listed in (54) and the particle -no, even though the two lexical markings are adjacent. In other words, the words in (54) are the exceptional case where accent clash avoidance does not apply. In these exceptional examples, we can assume that the non-application of accent clash avoidance is encoded as part of their lexical information, even though the correct environment is provided. And on this basis we may further assume that it is also possible for words which are not classified to induce the process in question, in fact to be subject to the process. The words listed in (50), not having their lexical accents on the final nuclei, are not expected to induce accent clash avoidance, when suffixed by -no. However, the relevant information is encoded in the lexicon such that the noun accent is deleted when suffixed by -no.

To sum up, it is proposed that some of the words contain lexical information which determines whether or not accent clash is induced.

In the following section I shall focus on another issue related to the accent clash phenomenon, namely, that involving words consisting of a single OR pair.

4.3.3. Nouns consisting of one OR pair and the issue of inaccessibility

In this section, pitch assignment in nouns consisting of one OR pair and the inaccessibility of domain-initial nuclei (3.2.4.2, 3.2.4.3) are considered. This study provides further support in favour of my analysis of the inaccessibility of domain-initial nuclei. I demonstrate that an initial nucleus (N1) cannot be affected by other nuclei: not only high-pitch sharing, but also accent clash phenomenon (4.3.2.1) is sensitive to the domain-initial nuclear position.

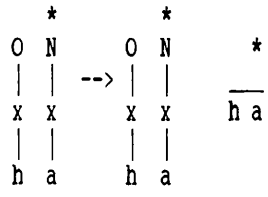
A set of data is presented in (55), giving two accentual types of nouns consisting of a single OR pair, with and without particles. In isolation, the pitch realisation of both noun types is identical. Whether the noun is lexically accented or not should only be deducible from the pitch patterns when various case-markers are affixed.

(55)

	*	*	* (*)
a.	$\overline{\text{ha}}$ 'tooth'	$\overline{\text{ha}}$ ga 'tooth-nom.'	$\overline{\text{ha}}$ no 'tooth-GEN.'
			*
b.	$\overline{\text{ha}}$ 'leaf'	ha $\overline{\text{ga}}$ 'leaf-nom.'	ha $\overline{\text{no}}$ 'leaf-GEN.'

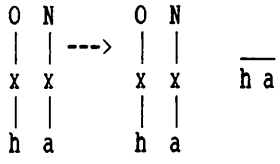
To begin with, I shall consider these nouns in isolation. When pronounced in isolation, both nouns are high-pitched. Following the Licensing Principle (Kaye 1990a), a domain has to have a head. And in the domain of a word consisting of one OR pair, there is only one nucleus. Therefore this single nucleus has to be the head of the domain, and as such is interpreted as high-pitched. Thus the nucleus of a word consisting of a single OR pair is always high-pitched, regardless of lexical accentuation.

(56)a.



'tooth'

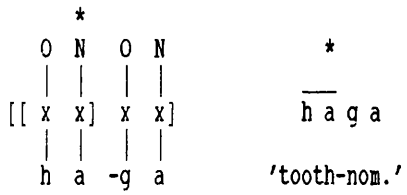
b.



'leaf'

The two nouns above have different pitch patterns when they are followed by particles. Recall that -ga is an accentless particle (4.3.1). If the noun is lexically accented, the -ga particle is not assigned a high pitch, because the high-pitch interpretation of the head nucleus only affects the nuclei to the left (3.2.4.1). Thus, a sequence consisting of the lexically accented noun ha 'tooth' and the particle -ga has the pitch pattern as follows in (57).

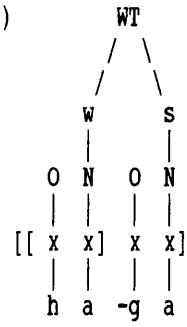
(57)



'tooth-nom.'

On the other hand, when the noun is not lexically accented, a high pitch is assigned only to the rightmost nucleus of the domain. Licensing relations at the nuclear projection in Standard Japanese are head-final, thus the rightmost nucleus is the head of the domain (3.2.4.4, 4.3.1). In these cases the rightmost nucleus of the domain is that of the particle. The nucleus of the noun is now inaccessible, being the domain-initial nucleus of a noun/particle domain. Hence, a high pitch cannot be shared by the inaccessible domain-initial nucleus, and a high pitch is assigned only to the rightmost nucleus (58).

(58)



h a g a

'leaf-nom.'

Now we focus on the pitch pattern of the words in (55) above with the Genitival particle -no. The Genitival -no is lexically accented (4.3.2), unlike the Nominative -ga. However, despite the difference in lexical accentuation between the two particles, the pitch patterns of the noun ha 'tooth' with -ga and with -no are the same (59a). Similarly with the noun ha 'leaf', the pitch patterns with the two particles are identical (59b).

(59) a.

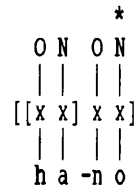
*		*	(*)
h a -g a	'tooth-nom.'	h a - n o	'tooth-GEN.'

b.

*		*	
h a -g a	'leaf-nom.'	h a - n o	'leaf-GEN.'

I shall now illustrate the process by which these pitch patterns are derived, applying the analysis discussed so far. First, I shall consider the accentless noun ha 'leaf' and -no. As I discussed in 4.3.2, the only lexically accented nucleus is that of the particle:

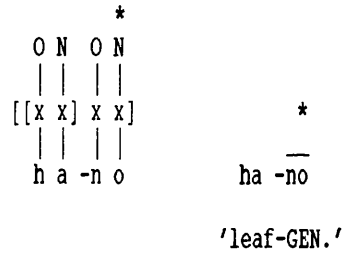
(60)



'leaf-GEN.'

The head nucleus of the word-particle domain is interpreted as high-pitched (61). High-pitch sharing between the head nucleus and the nuclei to the left does not apply, since the high-pitch nucleus to the left of the head is the inaccessible domain-initial nucleus (61):

(61)

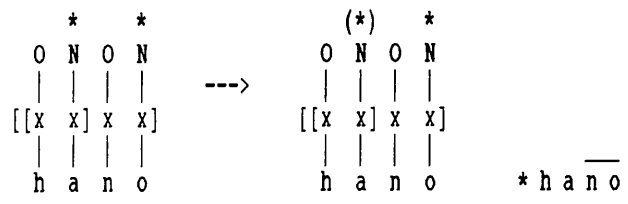


'leaf-GEN.'

The lexically accented nucleus of the particle is the only one that is high-pitched: the domain-initial nucleus is inaccessible. So, we observe a OH pitch pattern.

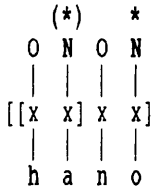
As in (62a), when both the noun and the particle are lexically accented, the head nucleus of the inner-domain A of the structure [[A]B] is projected as the head nucleus of the concatenated string (4.3.2). However, note that the two lexically marked nuclei are adjacent at the nuclear projection. Recall the analysis in 4.3.2: when two lexically marked nuclei are adjacent and in the environment where accent clash occurs, the one on the right dominates the other. As a result, the lexically marked nucleus to the right is the head nucleus, and a high pitch is shared by the head and the nuclei to the left, except for the inaccessible domain-initial nucleus (62b):

(62) a. b.

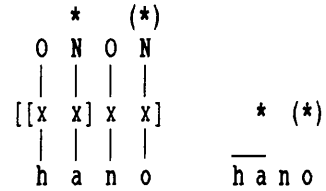


However, if the nucleus to the right is dominant, the derived pitch pattern ha-no 'teeth's' is OH, which is not an attested form. In other words, a word consisting of a single OR pair is not subject to this accent clash phenomenon. This outcome lends further support to the analysis of an inaccessible domain-initial nucleus, which cannot be affected by other nuclei, i.e. the nucleus is not subject to high-pitch interpretation of the head nucleus (3.2.4.1, 3.2.4.2). Also, the lexically marked domain-initial nucleus can not be dominated by the adjacent lexically accented nucleus, even in the environment of accent clash avoidance (63a):

(63)a.*



b.



My proposition regarding the inaccessibility of domain-initial nuclei (3.2.4.1, 3.2.4.2) is supported by the phenomena illustrated above, i.e. the lexically marked domain-initial nucleus cannot be deleted even when the nucleus is in the environment of accent clash avoidance.

In the following section, I shall discuss the morphology of Verbs, focusing on how a verb-stem and tense-morphemes are concatenated, and how an accent is assigned to the resulting sequence.

4.4. Verb Morphology

Before I begin my discussion of the interaction between Phrases in clauses (Chapter 5), I should demonstrate how pitch accent and high tone are assigned to sequences of verbs and tense morphemes.

4.4.1. Verb and the Tense morpheme

This section considers the tense morpheme and the Verb, how they are concatenated and how they interact in terms of accent assignment. To begin, I shall present some examples of Verbs with two tense morphemes, non-past -u/-ru[14] and past -ta. The verb stem is specified only as accented or unaccented, and the location of the accent is known to 'shift' depending on which tense morphemes follow it (Haraguchi 1977, McCawley 1968). I shall show that accent assignment in Verbs adheres to certain lexical information inherent in the tense morphemes and that the accent location does not 'shift' or slide from one nucleus to another. For the time being, I shall represent an accented nucleus with ^ under the relevant segment, since I have not yet discussed how the accent is assigned in Verbs. Although the first person singular is given in the translation, any other subject pronoun is equally applicable, since no verb agreement exists in Japanese[15].

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[14]The tense morpheme -u or -ru, depending on whether the verb stem ends with a consonant or a vowel, respectively, is called non-past, because Japanese only makes a distinction between past and non-past, i.e. there is no future tense morpheme.

[15]In a formal theory of GB (Government and Binding) Syntax, Fukui (1993) states that Japanese lacks AGR (agreement).

(64) V + non-past V + past

a. Accented Verb stem - tense

	*	*	
i.	mi ru	'(I) see.'	mi ta '(I) saw.'
	*	*	
ii.	de ru	'(I) emerge.'	de ta '(I) emerged.'
	*	*	
iii.	ta be ru	'(I) eat.'	ta be ta '(I) ate.'
	*	*	
iv.	o ti ru	'(I) fall.'	o ti ta '(I) fell.'
	*	*	
v.	a ki ru	'(I) get bored.'	a ki ta '(I) got bored.'
	*	*	
vi.	a ta e ru	'(I) give.'	a ta e ta '(I) gave.'

b. Unaccented Verb stem - tense

i.	ki ru	'(I) wear.'	ki ta '(I) wore.'
ii.	a ke ru	'(I) open'	a ke ta '(I) opened'
iii.	ho ro bi ru	'-- perishes.'	ho ro bi ta '-- perished'

A high degree of regularity can be observed in the data involving accented Verb stems in (64a); all the non-past forms have accents on the penultimate, while all the past forms except for (64ai&ii) have antepenultimate accent.

Before I present my analysis, I shall briefly outline how this so-called 'shift' of accent between the penultimate in non-past forms and antepenultimate vowel in past form is explained by Clark (1986), who employs the framework of Lexical Morphology (e.g. Kiparsky 1982, Mohanan 1982). I shall

then go on to show that the rule ordering introduced by Clark is unnecessary. Clark claims that the tense morphemes i.e. -ru (non-past) and -ta (past), are attached in the lexicon, adhering the following two constraints: i) -ru is a level I morpheme, while -ta is level II, ii) an accentuation rule that accents the penultimate mora of an accented verb applies at level I. In other words, there is a strict ordering of rules:

(65) a. Derivation of non-past -ru

Level I	1. -ru attachment	tabe-ru
	2. penultimate accentuation	tabe-ru ^
Level II	no rule to be applied	

b. Derivation of past -ta

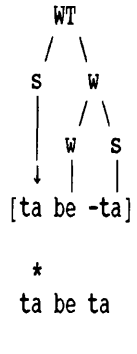
Level I	penultimate accentuation	tabe ^
Level II	-ta attachment	tabe-ta ^

The output forms are correctly assigned accents on the desired vowels. However, the ordering of the rules is stipulatory: an accentuation rule has to be applied AFTER -ru attachment, but BEFORE -ta attachment. The proposal I present here makes no reference to rule ordering.

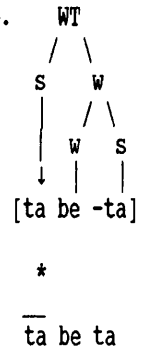
As I mentioned earlier, the past tense forms, with the exception of the one in (64aii) which I shall discuss later, have their accent on the antepenultimate nucleus. I do not consider this antepenultimate accent placement as a mere coincidence, but assume that it is derived from the same procedure as antepenultimate accented nouns, which have been discussed in Chapter 3 (3.2.4.4, 3.2.6.2). Recall that the lexical form of a noun without internal structure is assigned accent on the antepenultimate nucleus (see 3.2.4.4, 3.2.6.2 and 3.3 for a detailed account and exceptions). Furthermore I propose that the concatenation of a Verb stem and the past tense morpheme -ta is

similarly non-analytic. Thus, the accent is assigned on the antepenultimate nucleus if the stem is lexically marked as accented. I demonstrate how this concatenation works, taking the example tabeta '(I) ate', consisting of the stem tabe- 'to eat' and the past morpheme -ta: the metrical pattern is organised from the right-edge of the word, as if the concatenated form were a non-analysable string. The accent is assigned on the antepenultimate nucleus (66a), and the accent is interpreted as high pitch (66b).

(66) a.

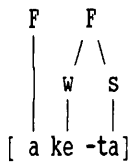


b.

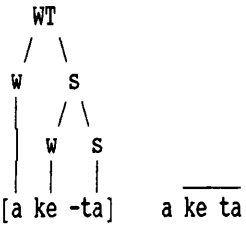


The unaccented verb ake- 'to open' follows a similar analysis: the metrical pattern is organised within the domain of [ake-ta] as if it were a non-analysable phonological string. However, since the Verb is lexically specified as unaccented, thus, no accent is assigned to the sequence of the Verb stem and the past morpheme -ta. The rightmost nucleus becomes the head of the domain. The head nucleus is interpreted as high-pitched, and the nuclei to the left recieve the high-pitch interpretation of the head nucleus, except for the inaccessible domain-initial nucleus.

(67)a.



b.



Accent and pitch pattern assignment of the past form is accounted for as above.

Before I move on to discuss non-past forms, I should note that in the case of verb stems which consist of one OR pair, the accent falls onto the only nucleus of the stem portion. Thus the

forms in (64ai&ii) have accent on the penultimate nucleus of the forms, unlike the other past form examples in (64).

The next question to be addressed is why the accented non-past forms of Verbs always assign accents on the penultimate nucleus or in other words, on the final N of the stem portion. In response, I propose that the Verb stem and non-past tense morpheme concatenation is also non-analytic. Having claimed that both tense morphemes are concatenated to the Verb stem in a non-analytic way, I should offer some explanation for the difference in accent location. I have stated that in Standard Japanese an accent is assigned to the antepenultimate nucleus of a word, unless the word has a lexical marking on a lexically designated nucleus: an accent is assigned to the head nucleus of the penultimate foot, which is head-final (3.2.4.4). In non-past (accented) Verb forms, an accent always falls on the penultimate nucleus: the non-past morpheme has the lexical property of assigning an accent to the preceding nucleus, that is, the stem-final nucleus.

(68)a. b.

Note that this works exactly in the same way as English stress assignment in non-analytic cases. For example, -ity causes stress on the nucleus that precedes it:

(69) a. áble abílity
b. divíne divínity
c. theátrical theatricálity

As (69) demonstrates, this suffix -ity has the lexical property of causing stress to fall on the preceding nucleus (Kaye 1993).

A theory-internal argument lends support to the non-analytic structure proposed for the non-past Verb concatenation. One could hypothesize that the lexical marking of the accented Verb is on

the stem final vowel, and that the lexical marking is projected to the non-past form of the Verb. But in order to assume so, we must make a further assumption which cannot be incorporated easily into the theory of Government Phonology. Only in the structure [[A]B], in which the lexical accent of the domain A is projected to the domain AB (as in the noun-particle concatenations discussed in 4.1), is the lexical accent of the verb stem [A]to be projected. As far as the set of data in (64) is concerned, this analysis is acceptable. In fact, the data in (64) only lists vowel-final Verb stems. When we consider consonant-final stems, such as hanas- 'to talk', we encounter problems.

For consonant-final verb stems, the accent is assigned in the same manner as in the case of vowel-final verb stems; the accent is assigned to the penultimate nucleus, that is, to the final nucleus of the verb stem portion of the inflected form. The assumption that the concatenation of a verb stem and the non-past tense marker is analytic [[A]B] means that the stem portion constitutes a domain, domain A. Then, for the sake of consistency within a category, a consonant-final stem as well as vowel-final stem, no less than a vowel-final stem, should constitute a domain:

(70)a. Vowel-final Verb stem

```
        *
  [[ta be] ru]
```

b. Consonant-final Verb stem

```
        *
* [[ha na s ] ru]
```

Note, however, every domain must end with a nucleus (1.1.1.4). Recall the Phonological ECP (KLV 1990, Kaye 1992) discussed in Chapter 1. I refer to the relevant portion of the ECP here:

(71) P-licensing

Domain-final (empty) categories are P-licensed
(Parameter: **true** German Polish Arabic, **false** Italian Japanese Vata)

We see that Japanese does not p-license the domain-final nucleus, in other words, a domain has to end in a phonetically realised nuclear position. If the stem portion were to constitute a domain, then

the verb stem would have to end in an empty nuclear position when the Verb stem ends with a consonant (70b), which is not permitted in Japanese:

(72) *
* [[ha na sφ] ru]

Thus, the stem portion cannot constitute a domain, and so the concatenation of the verb stem and the non-past tense morpheme cannot be analytic, *[[A]B].

4.4.2. Support from Complex Verb forms (causative and passive forms)

Accent assignment in complex Verbs lends support to the non-analytic analysis of Verb morphology. To begin, I present the data:

(73)

	NON-PAST FORM		PAST FORM	
a. Verb stem - tense				
i. Accented Verb stem				
	*		*	
	ta be ru	'(I) eat'	ta be ta	'(I) ate'
ii. Accentless Verb stem				
	a ke ru	'(I) open'	a ke ta	'(I) opened'
b. Stem-causative-tense				
	*		*	
i.	ta be sa se ru		ta be sa se ta	
	'(I) make someone eat'		'(I) made someone eat'	
	*		*	
ii.	a ke sa se ru		a ke sa se ta	
	'(I) make someone open'		'(I) made someone open'	

c. Stem - passive - tense

i. ta be ra re ru	ta be ra re ta
'someone eats on me'	'someone ate on me'
ii. a ke ra re ru	a ke ra re ta
'someone opens on me'	'someone opened on me'

d. Stem - causative - passive - tense

i. ta be sa se ra re ru	ta be sa se ra re ta
'(I) am made to eat'	'(I) was made to eat'
ii. a ke sa se ra re ru	a ke sa se ra re ta
'(I) am made to open'	'(I) was made to open'

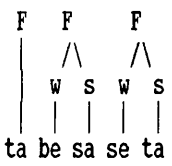
e. Stem - passive - causative

i. ta be ra re sa se ru	ta be ra re sa se ta
'(I) make (something) be eaten'	'(I) made (something) be eaten'
ii. a ke ra re sa se ru	a ke ra re sa se ta
'(I) make (something) be opened'	'(I) made (something) be opened'

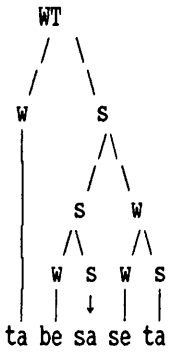
There is a strict regularity in the way complex Verbs are assigned accent. In causative/passive Verbs, regardless of the accentuation (accented or not) of the verb stem, past forms are always accented on the antepenultimate vowel, and in non-past forms on the penultimate. Since the causative and passive morphemes never occur in isolation, it is impossible to identify whether the morphemes in question are lexically accented or not. Past forms are composed of a non-analytic string,

consisting of a verb stem, causative/passive morpheme(s) and the past tense morpheme, concatenated as if they form a non-analysable word. Thus in the past form, an accent is assigned to the head nucleus of the penultimate foot, the antepenultimate nucleus. Let us take the past causative form of tabe- 'to eat' to see how the accent and high pitch are assigned. Feet are constructed from the right-edge of the word, as if the concatenated Verb form were a non-analysable word (74a). The accent is assigned to the head of the penultimate foot (74b):

(74) a.



b.



*
tabesaseta

The accent is interpreted as high pitched, and the pitch is shared by the nuclei to the left, but excluding the inaccessible domain-initial nucleus:

(75) *
ta be sa se ta

In this manner, the past morpheme is concatenated, and the accent and a high pitch are assigned.

Turning to the non-past form, we see that the accent is assigned to the penultimate nucleus. As I claimed earlier in 4.4.1, the accent in a non-past form is lexically specified as falling on the preceding nucleus of the non-past morpheme. As an example, I take the non-past causative form of tabe- 'to eat' in order to show how the accent and high pitch are assigned:

(76)a. * Accent is on the preceding nucleus of
ta be sa se ru the non-past morpheme

b. * The accent is interpreted as high pitched.
The nuclei to the left are also high-pitched
ta be sa se ru except inaccessible domain-initial nucleus.

In non-past forms, a verb stem, causative/passive morpheme(s), and the non-past tense morpheme are concatenated in non-analytic way, and an accent is assigned to the preceding nucleus of the non-past morpheme, abiding by the lexical specification of the tense morpheme.

I have shown that accent assignment in causative/passive forms of the Verb lends support the morphological analysis of the Verb presented in 4.4.1. In the next subsection I shall discuss combined Verbs, that is, Verbs consisting of more than one verb stem -, which provide evidence that accent assignment in Verbs derives from non-analytic morphology.

4.4.3. Another type of combined Verbs[16]

Consider a Verb consisting of two verb stems; in contrast to those forms with causative and passive morphemes discussed in 4.4.2, the lexical accentuation of each constituent verb stem is clear. Therefore the combined Verbs demonstrate that the lexical accentuation within each constituent verb stem plays no role in the resulting concatenated forms. This shows that the Verb morphology is always non-analytic. In the combination of two verb stems, there are four logical possibilities with respect to accentuation of verb stems, a) accentless stem plus accentless stem, b) accentless stem plus accented, c) accented stem followed by accentless stem, and d) a combination of two accented stems. In the following examples, I show both the non-past (i) and past (ii) forms of each combined verb.

[16]Here, the term combined Verb is equivalent to a so-called 'compound' Verb (Ishihara 1991, Poser 1984). I do not employ the term 'compound', because the output of two combined verb stems behaves like a non-analysable word (non-analytic word). I am going to show that these combined verb stems behave as a single unit in this section.

(77) a. Accentless-Accentless

a ke ru + ka e ru -----> i. a ke ka e ru

'to vacate' 'to change' 'to remove and transfer'

ii. a ke ka e ta

b. Accentless-Accented

ka e ru + a ki ru -----> ka e a ki ru

'to change' 'to be bored' non-past 'to be bored to change'

ka e a ki ta

c. Accented-Accentless

mi ru + su te ru -----> mi su te ru

'to see' 'to dump' non-past 'to desert'

mi su te ta

d. Accented-Accented

ta be ru + a ki ru -----> ta be a ki ru

'to eat' 'to be bored' non-past 'to be bored to eat'

ta be a ki ta

As the above data show, all the forms are accented regardless of the lexical accentuation of the

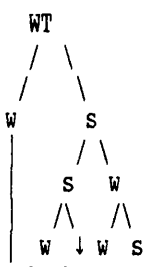
constituent verb stems[17]. Also note that the accent location follows that which is found in simplex accented verb stems: while the non-past forms are accented on the nucleus preceding -(r)u, past forms are accented on the antepenultimate nucleus. However, at first glance it seems somewhat mysterious to encounter those forms which end up bearing an accent, in spite of the fact that neither constituent is lexically specified as accented. In other words, an accent is assigned to the compound forms in the course of derivation, regardless of the fact that the individual verb stem has no lexically specified accentuation.

The fact that all combined Verbs have to be accented provides evidence in favour of the non-analytic analysis I presented in 4.4.1 and 4.4.2. That is to say, the combined Verb stems are treated as separate lexical entries, rather than as verb stems modified by another constituent stem. To this new lexical form, a speaker applies the derivation which he/she employs in other simplex Verb forms. That is, an accent is assigned to the Verb. When the tense is non-past, the tense morpheme has the lexical property of accenting the preceding nucleus (78a). If not lexically specified, which is the case with the past form, an accent is assigned on the antepenultimate nucleus of the Verb (78b).

(78) a.

```
        *
a ke ka e ru

        *
 ____
a ke ka e ru
```

b.




```
a ke ka e ta

      *
 ____
a ke ka e ta
```

Poser (1984) and Ishihara (1991) discuss the fact that these combined Verbs are known to have featured a different accent assignment in the speech of older speakers from those represented by the forms in

[17]I am referring to data supplied by comparatively young informants. I mention this, because Ishihara (1991) and Poser (1984) employ the 'old' forms which have different accentuation patterns from the data I listed. Both authors note that younger speakers use the forms I cite here.

(77). In (79) below, I list some examples from Ishihara (1991), in order to show that the accentuation of combined Verbs is in the process of changing from those in (79) to the uniform accentual pattern observed in (77). Ishihara states that in the combination of verb stems 1 and 2: i) if stem 1 is lexically accentless, the combined Verb output turns out to be accentless, and ii) if stem 1 is accentless, the combined Verb becomes accented. Following is the examples:

(79)

a. Accented Verb stem 1 --- accentless output

ha ne ru	+	tu ke ru	--->	ha ne tu ke ru
'sweep'		'attach'		'refuse'
de ki ru	+	a ga ru	--->	de ki a ga ru
'be done'		'go up'		'be completed'

b. Accentless Verb stem 1 --- accented output

a te ru	+	tu ke ru	--->	a te tu ke ru
'apply'		'attach'		'show off'
tu to me ru	+	a ge ru	--->	tu to me a ge ru
'serve'		'raise'		'finish serving'

As Poser (1984) and Ishihara (1991) point out, for younger speakers, all the output forms in (79) are accented: that is, the accent is located on the stem-final nucleus, since the forms listed above are non-past forms. In this way, I would like to appeal to the observation that accent assignment is moving in the direction of a uniform pattern in combined Verbs. If the combined Verb is a non-past tense form, then the accent is located on the stem-final nucleus. In other words, the combined Verb form is treated as a new lexical entry with no specification of lexical accentuation. Accent

assignment is applied to newly formed lexical entries, in this case, on the final-nucleus of the stem portion, in the non-past form, and thus it indicates that this accent assignment must be the lexical specification of non-past Verb morphology[18].

On the subject of historical change, I mention that a phenomenon in which a compound word loses it's compositionality is observed in other languages too. There is a case in English, to demonstrate that the compositionality of the 'compound' has been lost and given away to a non-analysable string. The former English compound cupboard had the analytic morphology [[cup][board]]; this structure has now been lost, and cupboard in present-day English behaves like an ordinary word with no internal structure phonologically (Kaye 1993). The consonant cluster pb has been eliminated as has the compound stress cúpbòard, in favour of cúpbŏard (Kaye 1993).

The following chapter extends the present discussion to embrace Phrasal interaction, addressing the question as to how the accent and high pitch are assigned to a sentence in Standard Japanese.

[18]Of course, a simplex unaccented stem, which was discussed in 4.4.1, remains unaccented, because the stem is specified as unaccented in the lexicon. Thus these unaccented stems have to be differentiated from Verbs whose accentuation is not lexically specified.

Chapter 5

PHRASAL INTERACTION OF PITCH ACCENT

How pitch accent is assigned to a sentence in Japanese

5.0. Introduction

The purpose of this chapter is to explain what kind of phonological processes take place when two Phrases are merged in connected speech. After explaining how the principles and parameters proposed in Chapter 3 derive the pitch patterns of connected speech forms, I investigate the environment in which the Phrases merge and pitch is assigned. As defined in Chapter 4, the term 'Phrase' is used to refer to the following objects: i) a sequence of a noun and a Case marker, ii) a Verb, which consists of a V-stem and its suffix(es) (as observed in Chapter 4).

First, I discuss a simple sentence consisting of a Subject, an Object and a Verb, to see how accent is assigned to it. At the same time, I explain what kind of morphological operation is at work in Phrase concatenation. Then, a study of the relation between a model of syntax and the formation of pitch-accent domains is discussed.

5.1. Beyond the Phrase

5.1.1. Problems

It has been reported that in Standard Japanese, any two (or three) adjacent Phrases may merge and constitute a single pitch accent unit in connected speech (McCawley 1968, Poser 1984). And McCawley and Poser both claim that syntactic structure does not have any bearing upon which adjacent phrases will merge to form such a domain in a sentence. However, contrary to their claim, I propose

syntax does have some affect upon the pitch pattern of a sentence. It is not possible to claim that there is one and only one definite pitch pattern for any sentence in connected speech (in particular,with respect to unaccented Phrases which are discussed in a separate section 5.1.4); indeed, sometimes a sentence does allow more than one pitch pattern (McCawley 1968, Poser 1984). However, through my observations of sample sentences read by native speakers, I have found that there is always one which may be deemed the most natural pitch pattern of a sentence. Thus, I use the most frequently employed pitch-patterns read by five informants, produced three times for each sentence.

Another point of this section is to show that Nespor & Vogel's hypothesis is not necessarily at work in Japanese: Nespor & Vogel (1982) predict that the morpho-syntactic head is the left-most constituent when more than one Phrase constitutes a single pitch-accent domain in a left-brancing language such as Japanese. This hypothesis is based on the assumption by McCawley (1977) that this accentual phenomena (the accent of the initial constituent predominates in the conflated phrase) in Japanese, which is a left-branching language, is the mirror image of the Nuclear Stress Rule (Chomsky & Halle 1968) in English, which is a right-branching language. This Nespor & Vogel hypothesis is correct only in a confined condition, namely, only when the left-most member contains an accent. If the initial member is not accented, the morpho-syntactic head is the left-most accented term elsewhere in the given domain. Also, as I show in 5.1.2.1, the morpho-syntactic head is the right-most term if a given phrase domain contains accentless Phrases only.

5.1.2. An account of pitch assignment in merged Phrases

In this section, I discuss the morphological operation of two merged Phrase-domains [[XP][YP]]. The first subsection discusses the pitch patterns of two-Phrase sentences, to focus on the way in which Phrases interact in connected speech: a two-Phrase sentence is ideal for observing pitch accent interaction, without, for the time being, referring to any syntactic relation between the Phrases in question.

5.1.2.1. A domain consisting of two merged Phrases

In Japanese, subjects are often not explicit. Consider the following four sentences, which lack overt Subjects.

(1) a. (Pro) mamoru-o homeru 'Pro praises Mamoru'
'Mamoru-acc.' 'praise- non-past'

b. (Pro) mamoru-o sikaru 'Pro scolds Mamoru'
'Mamoru-acc.' 'scold- non-past'

c. (Pro) takesi-o homeru 'Pro praises Takesi'
'Takesi-acc.' 'praise- non-past'

d. (Pro) takesi-o sikaru 'Pro scolds Takesi'
'Takesi-acc.' 'scold- non-past'

The pitch assignment of the sentences in (1) is considered. In a slow or careful speech, the above sentences have the following pitch patterns.

(2) Phrase 1 Phrase 2

a. m a m o r u -o s i k a r u

b. m a m o r u -o h o m e r u

c. t a k e s i -o s i k a r u

d. t a k e s i -o h o m e r u

The pitch assignment of the sentenses in connected speech is as follows:

(3) Phrase 1 Phrase 2

a. m a m o r u -o s i k a r u

b. m a m o r u -o h o m e r u

c. t a k e s i -o s i k a r u

d. t a k e s i -o h o m e r u

The first item (Phrase 1) of the phrase has exactly the same pitch pattern in (2) and (3). However, the second item in the phrase in (2) and (3) has a different pitch pattern. In (2a&b), the initial nucleus of Phrase 2 has no pitch, whereas in (3a&b) the nucleus bears high pitch. In (3c&d), there are no high pitched segments in Phrase 2, whereas in (2c&d) there are indeed high pitched segments

present.

The question to be addressed is why the second item (Phrase 2) of the sentence has different pitch pattern in slow/careful speech from that which it exhibits in connected speech. First, let us discuss the fact that the initial nucleus of Phrase 2 in (3a&b) is pitchless when in isolation but bears a high pitch in connected speech. To account for this, I refer to the analysis of pitch assignment repeated from Chapter 3 below:

(4)

a. Principles

i) Licensing principle (Kaye 1990a)

All phonological positions save one must be licensed within a domain. The unlicensed position is the head of the domain.

ii) Pitch Accent Principle

A pitch accent language has only one pitch, a high pitch. A high pitch is the immediate interpretation of a pitch accent.

iii) Lexical Marking Principle

A lexically marked nucleus, i.e. a nuclear position which is stressed/accented lexically, is the licenser of a domain, and thus cannot be a licensed member in its own domain.

b. Parameters for Standard Japanese -Licensing of Nuclear Heads-

i) The direction of licensing between nuclear heads is head-final at nuclear projection level 1. In metrical terms, feet are right-headed in Standard Japanese.

ii) The interpretation of pitch accent is that the accented nucleus (the head of the domain) and the nuclei to the left are all high-pitched.

iii) Domain-initial nuclei are inaccessible, and thus are not subject to high-pitch sharing.

Recall the pitch pattern of two accentless Phrases (2a) and (3a). In isolation, the initial nucleus of sikaru in (2a) is pitchless, being an inaccessible domain-initial nucleus. We see from (4biii) above that domain initial nuclei are inaccessible to high-pitch sharing. Since this is a phenomenon

which affects specifically the domain-initial nucleus, we may hypothesise that the nucleus of si is no longer domain-initial. In other words, in connected speech, the two Phrases form a single pitch-accent domain, and thus the initial nucleus of Phrase 2 does not behave like a the domain-initial one. To explain the high pitch on the initial nucleus of Phrase 2, si in (3a), we may formulate the following hypothesis:

(5) **Hypothesis**

In a sentence, in connected speech, adjacent Phrases form a domain.

The implications of this hypothesis are illustrated in (6). Two separate pitch domains (6a) are incorporated into a single domain, as in (6b).

(6)a. [mamoru-o] [sikaru]

b. [[mamoru-o][sikaru]]

The bracketing in (6) denotes the presence of a phonological domain: The brackets themselves are not intended to be interpreted as independent structural units (Kaye 1993). In other words, the brackets represent instructions as to the way phonological processing is to be carried out - that the results from the processing of the innermost strings are concatenated to form another string, to which the phonology again applies.

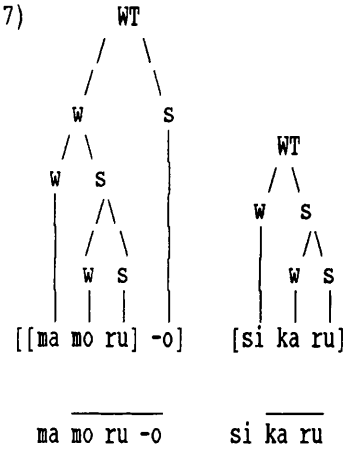
Due to the Licensing Principle (Kaye 1990a)(see also (4ai)), the presence of a stress (accent) bearing nucleus is indicative of domainhood (Kaye 1993). Within the inner domains, the one unlicensed position of a domain will assume headship of that domain. And in the concatenated domain, only one unlicensed position of that domain receives headship.

Assuming the hypothesis in (5), I now focus on how headship is determined in the external domains. In (7) we apply the hypothesis in (5) to the phrase. mamoru-o sikaru is incorporated into a single metrical domain. Phrases 1 and 2, which constitute their own separate domains, are concatenated: ϕ(concat(ϕ(P1),ϕ(P2))), in which phonological processes apply to P1 and P2, and to the concatenated external domain (see Kaye 1993 for detailed discussion of the morphology). This

morphological operation is represented by bracketing: [[P1][P2]].

Now consider two Phrases, mamoru-o and sikaru, without lexical marking for accent, which are represented as in (7) below, following the analysis in Chapter 3 (listed above in (4)) and the morphological analysis in Chapter 4:

(7)



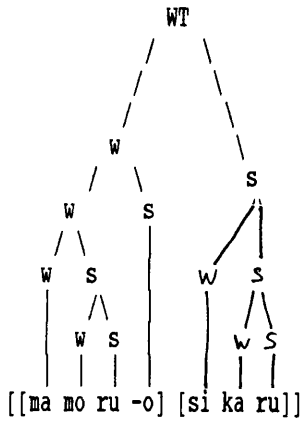
ma mo ru -o si ka ru

In isolation (and in slow careful speech form), the domain-initial nucleus of each Phrase is inaccessible to high-pitch sharing and is thus pitchless.

Once the relevant phonological process has been applied to inner domains, the process is then applied to the concatenated string. Being subject to the Licensing Principle, one nucleus has to be identified as the head of the concatenated domain.

The two Phrases are conflated into one single pitch-accent domain. There is no lexical marking in the nested domains, thus the rightmost nucleus of the phonological string in question is the head, due to the head-final nature of licensing relations between nuclear positions. The licensing relation is generally head-final, unless there is an accented nucleus in the domain, which is an inherent licenser (head) and licenses all the other nuclei at the relevant projection. Nevertheless, in this concatenation as represented in (8), there is no marked nucleus within any domain involved, and thus at any level of nuclear projection, the licensing relation is head-final:

(8)



Once headship is determined, the head nucleus is interpreted as a high pitched nucleus, and the pitch is shared by all nuclei to the left, except for the domain initial nucleus.

(9)

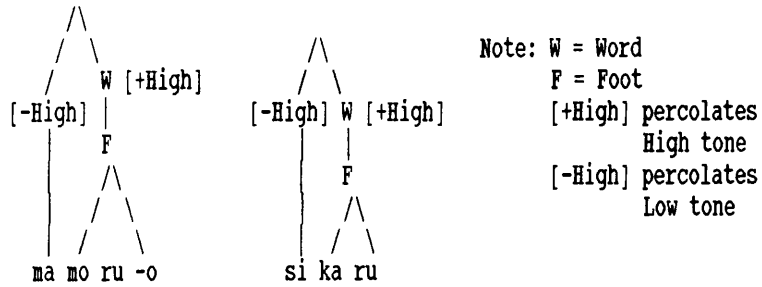
ma mo ru -o si ka ru

Here, note that the initial nucleus of the second domain ceases to be inaccessible to high pitch sharing. This pitch pattern in Phrases reveals that the high pitch sharing does not involve any structural operation such as percolation of a pitch via a metrical tree constructed upon the phonological string. One nucleus receives the headship of the domain in question, regardless of the domain being simplex or complex. The headship of the domain in question entails an interpretation such that a high pitch is shared by the head and nuclei to its left, excluding the inaccessible domain-initial nucleus. If the inaccessibility of the domain-initial nucleus stem from any structural difference, i.e. if the domain-initial nucleus is extrametrical and is thus not incorporated into the metrical tree constructed in the domain (e.g. Zubizarreta 1982), the structure formed in an inner domain has to be reorganised in the concatenated domain in order that the initial nucleus of the second domain may no longer be the domain-initial nucleus.

5.1.2.2. Against extrametricality (Support for inaccessibility)

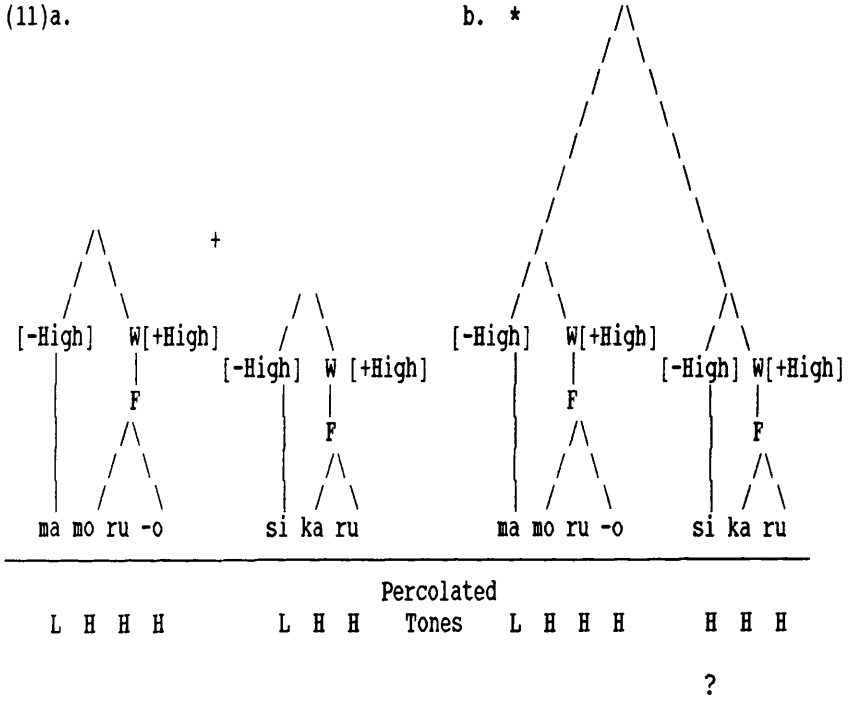
The fact that the Phrase-initial nucleus becomes accessible for high-pitch sharing in connected speech is attributable to the stipulation regarding the inaccessibility of the domain-initial nucleus in Standard Japanese. In other words, the domain-initial nucleus is inaccessible to high-pitch sharing (3.2.4) and should not be treated as extrametrical, which was the solution offered by Zubizarreta (1982). Zubizarreta's account considers the initial vowel to be extrametrical and not adjoined to the word tree, the construction of which excludes the initial vowel, until the nucleus is projected to the highest projection level (Zubizarreta 1982). Zubizarreta assumes extrametricality following Hayes (1980): the peripheral nucleus is not mapped onto higher metrical structure, and is attached to the structure by general convention. I represent the Phrases in (1b) employing Zubizarreta's analysis. Note the following two points: i) she employs Low for the segments which I treat as pitchless, ii) I only focus on the issue of extrametricality, and thus do not give any detailed explanation as to how feet are constructed in Zubizarreta (1982).

(10)



To the extent that the analysis is limited to the word level, this extrametricality does not give rise to any problems. However, the fact that, in connected speech, the Phrase-initial vowel, which is extrametrical, becomes high-pitched cannot be accounted for, unless the metrical tree of the word is reorganised into a form which will allow the desired pitch (10) to percolate down. At the same time, Zubizarreta mentions a general principle of 'structure-preservation' to maintain the same foot structure within the word throughout the course of derivation; thus, to reorganise the Word tree

amounts to a violation of this principle. (11a) demonstrates the tree in connected speech, preserving the structure created in each Phrase involved, which results in an incorrect pitch pattern. Thus, to map the correct tone pattern to the sequence of two Phrases, the initial nucleus of the second Phrase has to be reorganised so that it may no longer be extrametrical. The following representation illustrates the problem in question:



The high pitch on the initial nucleus of the second Phrase cannot be explained, unless the initial nucleus of the second Phrase i) is relabelled to percolate [+High] instead of [-High] by another extra rule, or ii) is reorganised and is incorporated into the metrical structure of the word, thus abandoning its extrametrical status. Both solutions are arbitrary.

My proposal of inaccessibility is only applicable to high-pitch sharing (and some other phonological processes (see 4.3.3)), and does not involve any reorganisation of metrical structure. As I mentioned earlier, the high pitch shared by the relevant nuclei is as a whole the interpretation of pitch accent, and does not involve any structural operation i.e. percolation of pitch via a metrical tree. The metrical structure is only relevant for accent assignment, as was discussed in Chapter 3, and then, once the head of a domain, the head nucleus is interpreted as high-pitched, then

so are the nuclei to the left except for the domain-initial nucleus in Standard Japanese. In these circumstances, if two Phrases are concatenated ϕ(concat(ϕ(Phrase A), (ϕ(Phrase B))), the head nucleus is determined in the external domain, and the head nucleus of the domain is interpreted as high-pitched along with the nuclei to the left excluding the domain-initial nucleus. When the Phrase-initial nucleus is not domain-initial (e.g. that of Phrase B, which is preceded by another Phrase, Phrase A, in the concatenated form), a high-pitch interpretation of the head nucleus affects the nucleus in question.

5.1.2.3. An accented nucleus as the morpho-syntactic head

The next discussion is devoted to an account of those cases where Phrases are lexically marked. Recall the sentences in (2b) and (3b), which are repeated below, in (12i) and (12ii) respectively. In place of the accentless Phrase 2, sikaru, a lexically accented Verb homeru (the lexically accented verb stem home- 'praise' with non-past suffix -ru, see Chapter 4 for a detailed discussion of the Verb) is employed. I follow the convention here that in i) the slow and careful speech form is given, and in ii) it is the connected speech form which is shown.

(12)

i) m a m o r u -o h o m e r u
*

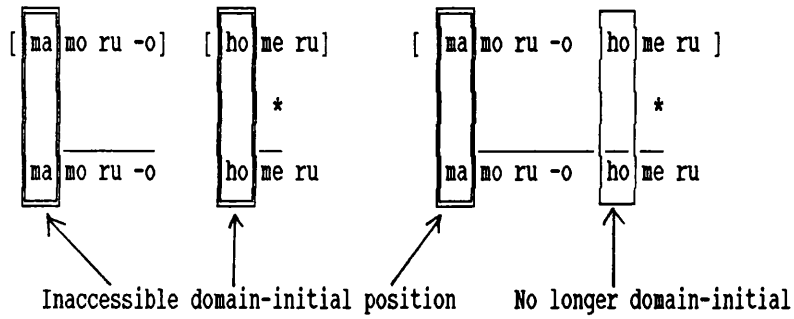
ii) m a m o r u -o h o m e r u
*

In the case of a merged domain (Object and Verb) in connected speech, high pitch is observed on all the positions from the lexically marked nucleus to the left, except for the domain-initial nucleus.

When there is one domain which is lexically marked, the marked nucleus is the head of the merged domain, following the Lexical Marking Principle: a lexically marked nucleus cannot be licensed by other nuclei (see (4aiii) and 3.2.3 for detail). As (12ii) demonstrates, in the connected-speech

form, the Object and the Verb form a single domain. The Verb-initial nucleus is subject to high-pitch sharing: in other words the Verb-initial nucleus is not the inaccessible domain-initial nucleus, being concatenated to its preceding Phrase (13b).

(13)a. b.



The location of the accent within the second Phrase does not matter, the accented nucleus is the head of the merged domain. In the following set of data, the forms in ii) show the connected speech pattern:

(14)a.

	usagi-o	mi-ru	'Pro looks at a rabbit.'
	'rabbit-acc.'	'look- non-past'	

i)

u sa gi -o mi ru

ii)

u sa gi -o mi ru

b. *
hiromi-o home-mas-(r)u 'Pro paises Hiromi.'

'Hiromi-acc.' 'praise-honorific- non-past'

i) *
hi ro mi -o ho me ma su

ii) *
hi ro mi -o ho me ma su

In the merged domain (Object-Verb), all the nuclei to the left of the accented nucleus, except for the domain-initial nucleus, are high-pitched.

So far, the accented Phrase 2 and cases in which Phrase 1 is accentless have been discussed. Next, I shall focus on the combination of an accentless Phrase 2 and accented Phrase 1. Examples (2c) and (3c) are repeated below:

(15)
i) *
t a k e s i -o s i k a r u

ii) *
t a k e s i -o s i k a r u

In the form (15ii), we see that the Verb portion of the sentence has no high-pitched positions. This also shows that the two Phrases, the Object and the Verb, form a single domain. The leftmost domain has a lexically marked nucleus (15), and the nucleus is the head of the concatenated domain. A high pitch only spreads to the left from the head nucleus, thus, no other nuclei in the concatenated Object-Verb domain are high-pitched except for the lexically marked nucleus (16b):

(16)a. Separate Domains ---> b. Concatenated

```
   *                                  *
[ta ke si -o]  [si ka ru]          [ta ke si -o  si ka ru]
   *                                  *
ta ke si -o    si ka ru            ta ke si -o  si ka ru
```

Accordingly, only the lexically marked nucleus is high-pitched and the rest of the nuclei remain pitchless (16b).

So far, I have demonstrated that the accented nucleus is the head of the merged pitch accent domain, if the nucleus is the only accented one in the domain. In fact, what we observed demonstrates that the forms (conatenated forms of the Phrases) are considered as one domain, to which the same phonological processes apply.

In the following section, I shall discuss the case where there is more than one accented nucleus in a concatenated domain.

5.1.2.4. Left-most accent as the head of concatenated domains

The question arises here as to which lexically marked nucleus is the head of the domain, if both concatenated domains contain lexically marked nuclei. To consider the point, I shall refer back to the discussion of the way in which compounded morphemes are sensitive to their grammatical category.

I have noted in 4.2.1.2, the syntactic distinction of the concatenated output is respected by accent assignment, I repeat the data from Chapter 4, where I discussed compounding of lexical categories. In each group, i) represents a phrasal category and ii) represents a lexical one.

(17)a.i)

```
      *      *          *   (*)
    a o i  +  mi do ri  -->  a o i mi do ri
'blue (adj)'  'green'        'blue green'
```

ii)

```
     *          *          (*)   *
     _          __               ____
     a o   +    mi do ri   -->   a o mi do ri
```

'blue(n.)' 'green' 'emerald green'

b.i)

```
       *        *              *  (*)
     na ga i  +   a me    -->   na ga i a me
```

'long(adj)' 'rain' 'long rain'

ii)

```
       *        *              (*) *
     na ga    +   a me    -->   na ga  a me
```

'being long' 'rain' 'a spell of wet weather'

Accent assignment is sensitive to the grammatical category of the morphemes[1]. Thus, if this line of assumption is correct, the leftmost lexically marked nucleus is the head of the domain.

As I have discussed in Chapter 4, pitch accent assignment is sensitive to the grammatical category of the morphemes concatenated: this is how a stress language, such as English, behaves, and thus pitch accent assignment is typologically categorised as stress assignment (4.2.1). Right-headedness in the compound forms of lexical items (i.e. the nouns, verb stems and suffixes discussed in Chapter 4) has been explained, along with a note that phrasal categories have their left hand member as the head. In Japanese, concatenation of phrasal categories such as a sequence of an adjective and noun, projects the accent of the adjective, the lefthand member, if both members are lexically accented. As the following discussion demonstrates, the (lexical) accent of the leftmost domain is projected to the external domain of any combination of phrasal category. Thus, there is no problem in proposing the same structure of concatenation [[A][B]] for a compound structure within category projection (Chapter 4) and for phrasal combination: the grammatical category of the

[1]As I have also noted in Chapter 4, the examples in (17) show that there is no ambiguity with respect to the adjectival or nominal forms: because of the adjective ending -i, it is therefore not only accent assignment that determines whether the word is a compound or phrase.

concatenated morphemes, namely whether they are lexical or phrasal items, determines whether the structure is head-final or head-initial, respectively.

(18) $[_C[A][B]_C]$

> In Standard Japanese, where both A and B contain lexical marking, i) if C is a lexical category, B is strong, ii) if C is a phrasal category, A is strong, and the marked nucleus of the strong element is the head of the domain. This is exactly the mirror image of English.

The following combinations are then considered: the accented Objects takesi-o 'Takesi-acc.' and inu-o 'dog-acc.' with the accented Verbs, home-ru 'praise- non-past' and mi-ru 'see- non-past'. The accentuation and pitch patterns of the Verbs when in isolation are shown under the heading of i) in each group. The connected-speech form is shown in ii).

(19)a.
```
   *          *
takesi-o   homeru
```
'Takeshi-acc.' 'praise- non-past'

```
        *          *
i)   ta ke si -o   ho me ru

        *          (*)
ii)  ta ke si -o   ho me ru
```

b.
```
   *        *
inu-o    homeru
```
'dog-acc.' 'praise- non-past'

```
        *        *
i)   i nu -o   ho me ru

        *        (*)
ii)  i nu -o   ho me ru
```

c. * *
takesi-o miru

'Takeshi-acc.' 'look- non-past'

* *
i) ta ke si -o mi ru

* (*)
ii) ta ke si -o mi ru

d. * *
inu-o miru

'dog-acc.' 'look- non-past'

* *
i) i nu -o mi ru

* (*)
ii) i nu -o mi ru

(19) demonstrates that, no matter where the lexically marked nuclei are located in the domain, if both the Object and the Verb are accented, the leftmost accent "wins" and becomes the head of the domain.

(20)

* * * (*)
[i nu -o] [ho me ru] [i nu -o ho me ru]

* * * (*)
i nu -o ho me ru i nu -o ho me ru

N.B. (*) denotes deleted accent

To summarise the analysis so far:

(21) If a domain has more than one marked nucleus, the left-most one is the head of the domain.

Then, the analysis of Phrase concatenation is the same as that of a noun-particle sequence: if there are two lexical markings in the concatenated domain, the leftmost one is the head of the domain (except for cases in which the two lexical markings are on two adjacent nuclei (4.3.2.1)). Therefore one might wonder whether the Phrase concatenation involves the same type of morphology as the noun-particle sequence, i.e. domain B is affixed to domain A, viz. [[A]B]. Having proposed the structure [[A][B]] for Phrase concatenation. It is important to provide sufficient justification for the proposal.

The next set of data demonstrates that Phrase concatenation involves a different type of morphology from that of noun-particle sequences. As we have observed in noun-particle sequences, if the lexical accent of the noun and the accent of lexically marked particle are adjacent, the lexically marked nucleus to the right becomes the head of the concatenated domain, due to accent clash. If Phrase concatenation took the same morphological structure as noun-particle sequences, we should observe the same accent clash phenomenon in Phrase interaction. Bearing this in mind, let us refer to the data. The data involve nouns whose lexical marking is located on the final nucleus. In fact in colloquial speech, it is quite common to drop a particle, when the Case of the noun can be determined from the context.

For example, consider some sets of answers to certain questions. To the question 'what do you want to draw?', responses such as following can be considered. The Case that is assigned to the noun in all the examples below is accusative, even though the particle <u>-o</u> is dropped in colloquial speech. Note that I also show a set of data with an accentless word (22a), to see the pitch contrast with the final accented word (22b).

(22) a.
```
          *
   hana-φ    kaku        'I (will) draw a nose.'

 'nose-φ'   'draw- non-past'
    (-acc.)
```

i)
```
      *
   ha na   ka ku
```

ii)
```
      *
   ha na   ka ku
```

b.
```
   *     *
   hana  kaku          'I (will) draw a flower.'

 'flower-φ'  'draw- non-past'
```

i)
```
   *   *
   ha na   ka ku
```

ii)
```
   *   (*)
   ha na   ka ku
```

The data set (22bi) is possible only when the utterance is pronounced very slowly, i.e. with a clear pause between the hana and kaku. In connected speech (22bii), the two Phrases, the Object and the Verb, form a single domain, and the leftmost nucleus with a lexical marking is the head of the domain. Note that accent clash does not apply to these Phrasal sequences, unlike noun-particle sequences.

Also, let us consider a typical after-dinner conversation. To the question 'which did you eat, chicken, or red meat?', following responses are possible:

(23) Replies to the question: 'Which did you eat, chicken, or red meat?'

a.
```
        *
    tori    tabeta     'I ate chicken.'
  'chicken-φ' 'eat-past'

  i)        *
      to ri   ta be ta

  ii)       *
      to ri   ta be ta
```

b.
```
      *     *
    niku    tabeta     'I ate red meat.'
  'meat-φ'  'eat-past'

  i)    *   *
      ni ku   ta be ta

  ii)   *   (*)
      ni ku   ta be ta
```

From the sets of data above, we see that the accent clash phenomena observed in noun-particle combinations do not occur in Phrasal sequences. The resolution of accent clash in two-Phrases domains, share the same outcome as normal Phrasal accent: the accent on the left wins. The morphological operation in merged domains is not identical to that of noun-particle sequences. In other words, the Phrase concatenation does not involve an [[A]B] concatenation, unlike the noun-particle sequences.

McCawley (1968) and Poser (1984) refer to a single Phrase as a 'minor-phrase', in contrast to a 'major-phrase' which is one consisting of two or more 'minor-phrases'. However, by considering

a domain of pitch accent, we are able to eliminate the arbitrary distinction between 'minor-phrase' and 'major-phrase' and collapse these into one notion, that of 'domain'. In other words, the process in question, i.e. the assignment of pitch accent in combined phrases, is merely subject to the repeated application of the phonological process, i.e. to determine the head nucleus of the domain, firstly in the inner domain, and then in the external domain. The principles and parameters discussed for a domain within a Phrase will account for domains which are formed by more than one Phrase.

So far, I have discussed how the pitch accent domains are concatenated in connected speech forms. In the following sections, I shall pursue the question of what kind of syntactic structures affect the merger of pitch accent domains in sentences.

5.1.3. Sentence structure and pitch pattern in SOV sentences

To discuss how two Phrases merge to form a single metrical domain in connected speech, (Pro)OV sentences have been employed. To determine whether there are any syntactic constraints on how Phrases form metrical domains, I shall consider SOV sentences in which there is an overt Subject. Consider the sequence of a lexically accented noun haha 'mother' and the nominative marker -ga.

In the sentences without overt Subjects, the Object and the Verb (the so called 'Verb Phrase') form a single pitch-accent domain. If we compare these with sentences that have overt Subjects in (24), we see that the accentual behaviour of the Object-Verb domain is the same. The accented nucleus is the head of the domain, if either the Object or the Verb is accented (24a&d). If neither Phrase is accented, the domain-final nucleus becomes the head of the 'Verb Phrase' domain (24b). When both are accented, the accent of the Object i.e. the left-most accent becomes the head of the domain (24c). The accentuation and pitch patterns of the Phrases in isolation are shown under the heading of i) in each group. The connected-speech form is shown in ii). What iii) represents is the impossible accent pattern, which is derived from merging Subject and Object Phrases:

(24)

a. i) *

[ha ha -ga] [ma mo ru -o] [si ka ru] 'Mother scolds Mamoru'

'mother-nom' 'Mamoru-acc' 'scold - non-past'

ii) *

[ha ha -ga] [ma mo ru -o si ka ru]

iii) *

* [ha ha -ga ma mo ru -o] [si ka ru]

b. i) * *

[ha ha -ga] [ma mo ru -o] [ho me ru] 'Mother praises Mamoru.'

'mother-nom.' 'Mamoru-acc.' 'praise- non-past'

ii) * *

[ha ha -ga] [ma mo ru -o ho me ru]

iii) * *

* [ha ha -ga ma mo ru -o] [ho me ru]

c. i) * *

[ha ha -ga] [ta ke si -o] [si ka ru] 'Mother scolds Takesi.'

'mother-nom.' 'Takesi-acc.' 'scold- non-past'

ii) * *

[ha ha -ga] [ta ke si -o si ka ru]

iii) * (*)

* [ha ha -ga ta ke si -o] [si ka ru]

d. i) * * *

[ha ha -ga] [ta ke si -o] [ho me ru] 'Mother praises Takesi.'

'mother-nom.' 'Takesi-acc.' 'praise- non-past'

ii) * * (*)

[ha ha -ga] [ta ke si -o ho me ru]

iii) * (*) *

[ha ha -ga ta ke si -o] [ho me ru]

In connected speech there is no change in the pitch pattern of the Object-Verb portion: the initial nucleus of the Object-Verb domain remains pitchless in (24a&b), and the accented nucleus of the Object-Verb domain remains accented. Also, note that there are no examples in which Subject and Object merge to form one single pitch-accent domain. Thus, I conclude that in the sentences above, two pitch-accent domains are formed, one in the Subject-Phrase domain, and one in the Object-Verb sequence:

(25) [S] [[O][V]] cf. ii) in (24)

*[[S][O]] [V] cf. iii) in (24)

In sum, syntactic structure is crucial in the assignment of accent. Before proceeding any further with the discussion of the syntactic structure of sentences, I raise the issue of the nature of accentless Phrases, focusing on the case where the Subject in an SOV sentence is accentless.

5.1.4. Consideration of a third Phrase

In the previous section, I discussed sentences without overt Subjects. In 5.1.3, I only employed lexically accented words as Subjects. Below, examples of accentless Subjects are presented.

As previously mentioned, Subjects are deemed not to be included in the domain of high-tone assignment in SOV sentences (5.1.3). However, the following examples suggest that this claim must be modified. I replace the accented Subject haha-ga 'mother-nom.' used in 5.1.3, with ane-ga 'sister-nom.' here. In the sections labelled ii) I have listed the possible pitch patterns pronounced by my informants. In ii)(a) are those patterns where Object and Verb form a single domain [S][[O][V]], following the analysis in 5.1.2. In ii)(b) the initial nucleus of the Object is also subject to high-pitch assignment: this shows that the Object-initial nucleus is not domain-initial.

(26) a.
ane-ga hiromi-o sikaru

'sister-nom.' 'Hiromi-acc.' 'scold- non-past'

i) [a ne -ga] [hi ro mi -o] [si ka ru]

ii)
a) [a ne -ga] [hi ro mi -o si ka ru]

b) [a ne -ga hi ro mi -o si ka ru]

c)*[a ne -ga hi ro mi -o] [si ka ru]

b.

ane-ga inu-o sikaru

'sister-nom.' 'dog-acc.' 'scold- non-past'

i) *

[a ne -ga] [i nu -o] [si ka ru]

ii) *

a) [a ne -ga] [i nu -o si ka ru]

*

b) [a ne -ga i nu -o si ka ru]

*

c)*[a ne -ga i nu -o] [si ka ru]

c. *

ane-ga hiromi-o homeru

'sister-nom.' 'Hiromi-acc.' 'praise- non-past'

i) *

[a ne -ga] [hi ro mi -o] [ho me ru]

ii) *

a) [a ne -ga] [hi ro mi -o ho me ru]

*

b) [a ne -ga hi ro mi -o ho me ru]

*

c)*[a ne -ga hi ro mi -o] [ho me ru]

d.

ane-ga inu-o homeru

'sister-nom.' 'dog-acc.' 'praise- non-past'

i) * *

[a ne -ga] [i nu -o] [ho me ru]

ii) * (*)

a) [a ne -ga] [i nu -o ho me ru]

* (*)

b) [a ne -ga i nu -o ho me ru]

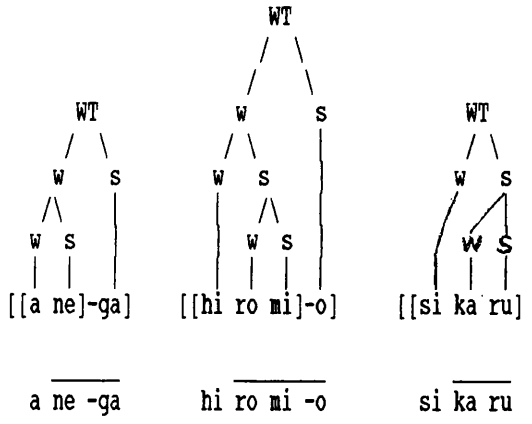
* *

c)*[a ne -ga i nu -o] [ho me ru]

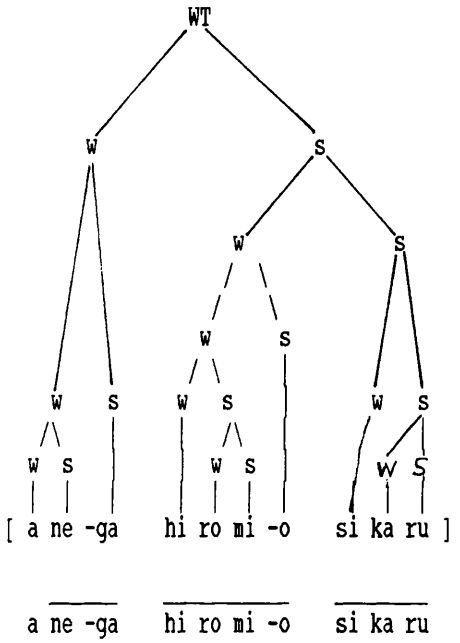
If the initial Phrase is unaccented, it may be incorporated into a domain of high-pitch assignment with other Phrases in the sentence, for example in the case above, S of the SOV sentence. The leftmost lexical accent is the head of the domain, and the high-pitch is assigned to all the nuclei to the left, except for the initial nucleus of the sentence. Note that none of the informants gave the pitch patterns in ii)(c), which would imply the structure [[S][O]][V].

The domain which does not have any lexical marking seems to attach onto the other domain. When in isolation, the domain has to have a head, and abides by the head-final nature of licensing relations between nuclei at the level of nuclear projection in Japanese. The domain-final nucleus therefore becomes the head. However, if there is another Phrase to its right, the head-final nature of licensing between nuclei at their projection allows the head nucleus of the rightmost tree to license other nuclei:

(27) a.



b.



Note that this does not happen in the case of Subjects (the third Phrase) if they contain lexical marking. Recall the Lexical Marking Principle (3.2.2), which states that, if the third Phrase contains a lexical marking, the marked nucleus cannot be licensed. The lexically marked Subject-Phrase domain does not attach onto the domain (Object-Verb domain in the case discussed above) consisting of the other two Phrases.

I have to note about the pitch pattern which implies the syntactic configuration [[Subject][Object]][Verb], which never applies regardless of the accentuation of the Phrases involved. The structure of SOV sentences is either [S][[O][V]], or it is limited to cases where S does not contain a lexical marking (an accent), [[S][V][O]]. Therefore, for the time being, I conclude that

the 'Verb Phrase', Object and verb form one single domain, whereas the Subject does not: this allows an exceptional case, as I have noted, in which an accentless Subject may be combined into the 'Verb Phrase' domain, unlike an accented Subject-Phrase domain.

5.2. Sentence structure and accent assignment

In previous sections, a 'Verb Phrase' consisting of an Accusative Phrase and a Verb has been considered. Next, I shall consider another type of 'VP', that of a Dative and a Verb, to see if the Dative Phrase and Accusative Phrase behave any differently. If all types of 'VP' in Japanese form one tonal domain, the combination of a Dative and a Verb should also follow the same pattern. From the analysis in section 5.1, we know that we have to consider four accentual combinations of a Dative and a Verb: when both are accented, when both are accentless, and when one or the other is accented.

5.2.1. The pitch pattern of a 'Verb Phrase' with Dative Case

The Dative Case is marked by the particle -ni. This particle is lexically accentless i.e. behaves like -ga as I noted in 4.3.1: the pitch assignment of the Dative is the same as that of the nominative -ga and the accusative -o. The pitch patterns of the accentless Dative Phrase mamoru-ni 'Mamoru-dat.', and the accented Dative Phrase takesi-ni 'Takesi-dat.' are as follows:

(28)a. ma mo ru -ni 'Mamoru-dat.'

b. * ta ke si -ni 'Takesi-dat.'

The Verb tanomu, which is composed of tanom- 'to rely on' and -u (non-past), is an accented Verb. ageru, which is composed of age- 'to give' and -ru (non-past), is an accentless Verb. Following the analysis in Chapter 4, the pitch patterns of the verbs are as shown in (29).

(29)a.

```
        *
       ta no mu
```

b. a ge ru

The Verbs above are used in the example sentences below. Subjects are shown in brackets, because the presence of the overt Subject makes no difference to the pitch pattern of the 'VPs' (5.1.3). The prediction is that if a Dative and a Verb form a single pitch-accent domain, the pitch assignment will be as follows: the leftmost lexically marked nucleus (accented nucleus) becomes the head of the combined domain, but if none of the members are accented, the final nucleus of the combined domain is the head. The high pitch is shared by the head and its licensees, except for the domain-initial nucleus.

(30)a. *
(takesi-ga) mamoru-ni ageru '(Takesi) gives to Mamoru'
('Takesi-nom.') 'Mamoru-dat.' 'give- non-past'

i) *
([ta ke si -ga]) [ma mo ru -ni] [a ge ru]

ii) *
([ta ke si -ga]) [ma mo ru -ni a ge ru]

b. *
(takesi-ga) mamoru-ni tanomu '(Takesi) relies on Mamoru'
('Takesi-nom.') 'Mamoru-dat.' 'to rely on - non-past'

i) * *
([ta ke si -ga]) [ma mo ru -ni] [ta no mu]

ii) * *
([ta ke si -ga]) [ma mo ru -ni ta no mu]

c. *
(mamoru-ga) takesi-ni ageru '(Mamoru) gives to Takesi'
('Mamoru-nom.') 'Takesi-dat.' 'give- non-past'

i) *

([ma mo ru -ga]) [ta ke si -ni] [a ge ru]

ii) *

([ma mo ru -ga]) [ta ke si -ni a ge ru]

d. *
(mamoru-ga) takesi-ni tanomu '(Mamoru) relies on Takesi'
('Mamoru-nom.') 'Takesi-dat.' 'rely on - non-past'

i) * *

([ma mo ru -ga]) [ta ke si -ni] [ta no mu]

ii) * (*)

([ma mo ru -ga]) [ta ke si -ni ta no mu]

(30) fulfils our expectations exactly. So, in keeping with the pattern established with the Accusative-Verb Phrases, the leftmost lexically marked (or accented) nucleus becomes the head of the combined Dative-Verb domain. If neither Phrase is accented, the final nucleus of the combined domain is the head in the connected speech form.

On the basis of the discussion in the previous subsections, I tentatively conclude that in a sentence, a 'Verb Phrase', or concretely, a node that dominates a Verb and either a Dative or an Accusative (VP in (31)), forms a single domain of high-pitch assignment.

(31)

The tentative conclusion that a 'Verb Phrase' is the pitch-accent domain is tested in 5.2.1. The

analysis of pitch domains is applied to a sequence of a Subject and a Verb, which is not a 'Verb Phrase'.

5.2.2. Subject and Verb

So far, the discussion has focused on 'Verb Phrases', and I mentioned that overt Subjects may be optionally absent from sentences. Similarly, other grammatical categories may also be absent from a sentence. Consider a sentence consisting of a Subject and a Verb[2] in Japanese. For example:

(32) a. mamoru-ga tanom-(r)u 'Mamoru relies on'
'Mamoru-nom.' 'rely on - non-past'

b. takesi-ga age-ru 'Takesi gives'
'Takesi-nom.' 'give- non-past'

As I tentatively concluded, if we assume that only a 'Verb Phrase' forms a pitch-accent domain, or if the domain formation in question is confined to sisterhood in the syntactic model, Subject and a Verb in a sentence should not merge their pitch-accent domains.

(33)

a. * [[Subject] [Verb]]

b. [Subject] [Verb]

To see if this assumption holds, four sentences are considered with all their possible accentual combinations, namely accented and unaccented Subjects and Verbs. As discussed in previous sections, takesi-ga has the accent on the initial nucleus of the Subject, and mamoru-ga is an accentless Subject. tanomu has the accent on the penultimate nucleus, and ageru is accentless (5.2.1). I only show the forms as they appear in connected speech:

[2]In Japanese, such a sentence (with only a Subject and a transitive Verb) is well-formed, in contrast with a language in which a transitive Verb requires the overt appearance of an Object, e.g. English (Fukui 1986).

(34)

a. ma mo ru -ga a ge ru 'Mamoru gives'
*

b. ma mo ru -ga ta no mu 'Mamoru relies on'
*

c. ta ke si -ga a ge ru 'Takesi gives'
* (*)

d. ta ke si -ga ta no mu 'Takesi relies on'

From the pitch patterns in (34), we see that a Subject and a Verb do in fact interact to assign an accent. In (34ab), the initial nuclei of the Verbs have a high pitch, which means that the nuclei are no longer domain initial. In (34cd), placed after an accented Subject, the Verb does not have any high pitch; even though the Verb is lexically accented (34d), the accent is not interpreted in the sentence. In fact this interaction is the same as has been found in the analysis of a 'Verb Phrase'. The left-most accent is the head of the domain. From this data, I conclude that in a sentence consisting of a Subject and a Verb, the two constituents form a single pitch-accent domain. This is rather an unexpected result, because our hypothesis was that it was the syntactic constituent comprising a Verb and its complement which formed the pitch-accent domain (VP in (35)):

(35)

In this model there is a node which dominates both the Object and Verb, but not the Subject.

This result implies that the fusion of pitch-accent domains occurs regardless of the syntactic structure i.e. not confined to sisters. Now, to pursue further the question of whether the formation of a harmony domain is sensitive to syntactic structure or not, I shall consider four-Phrase sentences. We have already observed that the merged domain always includes the Verb, in

a sentence consisting of three Phrases. Based on the most natural pitch pattern of sentences[3], I shall demonstrate that there is a strong tendency for a Verb and its adjacent Phrase to form a single pitch-accent domain, even in four-Phrase sentences.

5.2.3. Sentences consisting of four Phrases

5.2.3.1. Subject-Dative-Accusative-Verb sentences

To discuss the possibility of tone harmony domain formation, a sentence that has a ditransitive Verb is considered. A ditransitive Verb takes two complements (Objects), a Dative (an indirect Object) and an Accusative (a direct Object).

(37)takesi-ga hana-ni tuti-o kakeru 'Takesi lays soil for flowers'
'takesi-nom' 'flower-dat' 'soil-acc' 'put (lay)- non-past'

Consider the pitch accent assignment of the sentence (37). If we accept McCawley and Poser's claim that there is no syntactic constraint relating to Phrases merging to form a single accent domain, then any two adjacent Phrases should be able to merge. The following prediction is made, based on McCawley and Poser's claim:

(38)Hypothesis:
If there is no syntactic constraint on how Phrases form pitch accent domains, then:

Prediction:
In a sentence consisting of four Phrases, any two adjacent Phrases merge to form a single pitch accent domain.

Assume a sentence consisting of four Phrases, A,B,C and D. Following the hypothesis in (38), there are four logical possibilities for Phrases to form domains: 1) the initial two Phrases, A

---

[3]As I mentioned in 5.1.1, to ascertain the most natural pitch pattern, I chose as my informants five native speakers who were born and brought up in Tokyo. I asked them to read each sentence three times. As long as the data included only the sentences consisting of four accented Phrases, all my informants read them with the pitch patterns I present in 5.2.3 without any other variation in pitch assignment.

and B, form a single domain and at the same time the latter two, C and D, form another single domain (39a); 2) only the initial two Phrases, A and B, merge (39b); 3) the last two Phrases, C and D, merge (39c); and 4) leaving the initial (A) and the final (D) Phrases, the two Phrases in the middle, B and C, form one domain (39d).

(39)a. [A B][C D]

b. [A B][C][D]

c. [A][B][C D]

d. [A][B C][D]

Now, let us observe how the accent is assigned to the sentence introduced in (37). All Phrases in sentence (37) are accented, and they are pronounced as follows when in isolation:

(40)a. * b. * c. * d. *

ta ke si -ga ha na -ni tu ti -o ka ke ru

'Takeshi-nom' 'flower-dat' 'soil-acc' 'put (lay)- non-past'

To interpret the pitch pattern of the sentence, recall the analysis in (5.1, 5.2) to identify which Phrases may potentially merge: if two domains merge to form a single accent domain, the left-most accented nucleus is the head. In other words, if Phrases A and B which are both accented, form a single accent domain, the accent of Phrase A is the accent of the domain AB. The sentence in (37) is pronounced as follows, without any high pitch in the Verb:

(41) * * * (*)

ta ke si -ga ha na -ni tu ti -o ka ke ru

The pitch pattern above shows that the Phrases form domains as follows:

(42)

* * * *

[[takesi-ga] [hana-ni] [[tuti-o][kakeru]]

[[A] [B] [[C][D]]]

Three Phrases, takesi-ga, hana-ni and tuti-o, are pronounced in the same way as when they are pronounced in isolation, whereas the Verb kakeru is not. According to the analysis in section 5.2.2, the Verb and the adjacent Phrase form one domain: if two Phrases merge to form one accent domain, the leftmost accented nucleus is the head and the other is deleted. The Verb forms a single accent domain with the adjacent Phrase tuti-o. In a sentence consisting of four Phrases, the Verb and its adjacent Phrase form a single accent domain. I assume that no other pronunciation is possible.

Let us examine another sentence consisting of four accented Phrases:

(43)a. * b. * c. * d. *

ta ke si -ga a ya -ni ho N -o a ge ma su
'Takeshi-nom' 'Aya-dat' 'book-acc' 'give- polite '
non-past

In isolation, the Phrases are pronounced as above. As a sentence, the pitch pattern is:

(44) * * * (*)

ta ke si -ga a ya -ni ho N -o a ge ma su

'Takeshi gives Aya a book'

The accent of the Verb is not interpreted. In sentence (44) then, the accusative and the Verb also form a single domain.

To summarize the observations concerning a sentence consisting of four Phrases, a Verb and its adjacent Phrase, an Accusative, are subject to merger to form a single domain. Taking the pitch patterns of the sentences above into account, the hypothesis (38), which predicts that any two arbitrary adjacent Phrases can form an accent domain has to be reconsidered. In the next section, I discuss constraints relating to the formation of accent domains in a sentence.

5.2.3.2. Sentence structure of Japanese

-- Scrambling and Case assignment --

So far, we have observed how Phrases interact with each other, and we found that not all adjacent pairs of Phrases may combine to form a domain. Therefore there must be some constraint which prevents certain Phrases from forming an accent domain.

In 5.1-5.2.3.1, we found that a Verb and any Phrase immediately preceding it may form an accent domain. Even when sentences have four Phrases, it is the Verb and its adjacent Phrase which combine to form a domain (5.2.3.1). In considering the structure of a Japanese sentence, it is important to keep in mind that word order is very flexible, i.e. at S-Structure[4] an Object may optionally precede a Subject. In fact, direct Objects, indirect Objects and Subjects may occur in any order at S-Structure. There is, however, a strict restriction on the location of Verbs, viz. that a Verb must appear sentence finally, and does not undergo scrambling (except for the special case[5] which is discussed in a subsequent section). Although there are cases of scrambling that occur across clauses, known as 'long distance scrambling', I deal only with clause-internal structure to try to understand accent domain formation. The following six synonymous sentences, meaning 'Takesi puts (lays) soil to flowers', show the effects of clause-internal scrambling:

---

[4]I assume a level of syntax S-Structure being derived from D-Structure, the level of lexical insertion.

[5]The exceptional case is discussed independently (5.3.2); briefly however, there is a special case in which a Phrase appears to the right of the Verb (see also Saito 1985):

a. kyoo sigoto-o suru 'Today, I do (the) work'
'today' 'work-acc' 'do- non-past'

b. kyoo suru, sigoto-o. 'Today, I do (the) work'

b. is the case where the Verb is not the sentence final constituent. The accusative, sigoto-o appears after the Verb.

(45)a. takesi-ga hana-ni tuti-o kakeru
'Takeshi-nom' 'flower-dat' 'soil-acc' 'put- non-past'

b. takesi-ga tuti-o hana-ni kakeru
c. tuti-o takesi-ga hana-ni kakeru
d. tuti-o hana-ni takesi-ga kakeru
e. hana-ni takesi-ga tuti-o kakeru
f. hana-ni tuti-o takesi-ga kakeru

As long as the Verb remains at the end, the other three Phrases can appear anywhere in the sentence. This is possible in Japanese due to the presence of Case markers, which are overt[6], to indicate the syntactic function of noun phrases. In other words, Japanese is not a language with Structural Case assignment like English (Stowell 1981, Chomsky 1981, Saito 1985, Fukui 1986). Because of this comparatively 'free' word order, Japanese has been said to be a nonconfigurational language (Hale 1980), or a free word order language. However, due to the asymmetric behaviour of Subjects and Objects (see Saito (1985), Fukui (1986) etc.), and to the fact that the Verb is always located at the end of a sentence, a configurational analysis of Japanese has been pursued. I take the position that Japanese is a configurational language in this thesis.

Before I go into any syntactic analysis, I represent the pitch patterns of the six sentences above, to show how the scrambling operation influences the accent assignment of a sentence. In isolation, the Phrases used in the sentences are as follows:

* * * *
(46) ta ke si -ga ha na -ni tu ti -o ka ke ru
'Takesi-nom' 'flower-dat' 'soil-acc' 'put- non-past'

In the set of sentences (45), the Phrases above show pitch realisation as follows:

[6]Case markers are overt in Japanese, except for those colloquial speech examples I discussed in 5.1, in colloquial speech where the Case of the Phrase is clear from the context, and thus is dropped. Regardless of whether the Case markers are overt or not, the Phrases may be subject to scrambling.

(47) * * * (*)

a. [[ta ke si -ga] [ha na -ni] [[tu ti -o] [ka ke ru]]]

* * * (*)

b. [[ta ke si -ga] [tu ti -o] [[ha na -ni] [ka ke ru]]]

* * * (*)

c. [[tu ti -o] [ta ke si -ga] [[ha na -ni] [ka ke ru]]]

* * * (*)

d. [[tu ti -o] [ha na -ni] [[ta ke si -ga] [ka ke ru]]]

* * * (*)

e. [[ha na -ni] [ta ke si -ga] [[tu ti -o] [ka ke ru]]]

* * * (*)

f. [[ha na -ni] [tu ti -o] [[ta ke si -ga] [ka ke ru]]]

From the analysis carried out so far, the interpretation of the pitch patterns is as follows: in all the sentences (47), the Verb and the adjacent Phrase (regardless of Case) form a domain of pitch accent assignment.

There are two assumptions which can be derived from the observation above. The first is that the Verb has a special status in the sentence, and thus the adjacent Phrase is merged to form a pitch accent domain. The second is that any two rightmost Phrases merge to form the accent domain. To see which assumption is appropriate, I shall now delve further into the syntactic structure of the Japanese sentence, bearing in mind that the Verb and its adjacent Phrase form an accent domain.

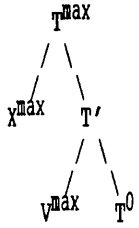
5.3. The status of the Verb in a Japanese sentence

5.3.1. Model of a Japanese sentence (Fukui 1993)

In this subsection, I illustrate a model of a Japanese sentence to emphasize my point that pitch accent phenomena refer to syntactic structure. I follow the Standard GB (Government and Binding) assumptions (Chomsky 1986, Pollock 1989) and refer to Fukui (1993) for the analysis of Japanese.

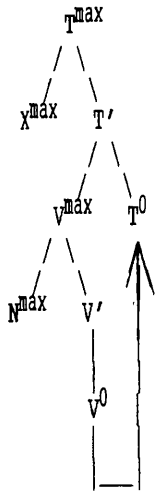
Japanese sentences are left branching, having the head of the sentence T (tense) in sentence-final position (Fukui 1993).

(48)



Also, I assume Verb Movement (Chomsky 1986, Pollock 1989) such that the Verb moves to T[7] to receive tense:

(49)



[7]In other languages, for example English, the head of the sentence is Infl (inflection), which may be split into Agr (agreement) and T (tense).

In Japanese, not only Verbs but also Adjectives are inflected for Tense. One might wonder then, what happens to a sentence which only consists of nouns and adjectives, such as:

(50) sora-ga aoi 'the sky is blue'

'sky-nom.' 'blue'

As in Kuno (1973), all verbs and adjectives in Japanese are treated as verbals: adjectives inherently represent states as opposed to verbs, the majority of which represent actions. In fact, Adjectives are conjugated in Japanese in terms of tense. For example, adjectives can be present (unmarked) or past:

(51) sora-ga aoi 'the sky is blue'

sora-ga aokatta 'the sky was blue'
(aok-ar-ta)

'sky-nom.' 'blue-be-past'[8]

Recall that the rightmost Phrase and the adjacent one form one accent domain. In the structure above (51), the rightmost Phrase is the tensed Verb, and it's adjacent Phrase is the N^{max} under the V^{max}. Based on this observation, the following assumption is made: the tensed Verb and the Phrase c-commanded (niece) by the head of the sentence, T, forms an accent domain.

The assumption holds as long as the sentence does not involve any movement, such as scrambling. Scrambling of a Phrase leaves a t (trace): when the Phrase scrambles to the left, which is an adjunction operation (Fukui 1993), this consequently leaves a t. As we have observed in (47) above, the pitch patterns of sentences which result from scrambling are not sensitive to the presence or absence of a trace between the two merged Phrases. Assume the base-generated word-order to be SOOV: even when both Objects are moved to the left, the Subject and the Verb form

[8]At present I cannot explain why only past tense adjectives involve be-verb ar- and not present tense adjectives, therefore I only describe the morpheme analysis as above.

a single accent domain across two traces. To be more precise, I show a set of data consisting of various forms of a sentence, before and after scrambling. I show t, where appropriate, assuming that SOV is the base-generated order:

(52)

a. * * *

neko-ga inu-o odos-(r)u 'The cat frightens the dog.'

'cat-nom.' 'dog-acc.' 'frighten- non-past'

i) * * *

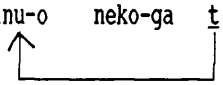
[ne ko -ga] [i nu -o] [o do su]

ii) * * (*)

[ne ko -ga] [[i nu -o] [o do su]]

b. * * *

inu-o neko-ga t odosu 'The cat frightens the dog.'



i) * * *

[i nu -o] [ne ko -ga] t [o do su]

ii) * * (*)

[i nu -o] [[ne ko -ga] t [o do su]]

Thus, as the example demonstrates, domain formation in connected speech does not refer to the absence/presence (refer to (52aii) and (52bii), respectively) of a trace. The next question to be addressed is whether accent domain formation refers to Syntax at all, or whether it is simply insensitive to traces.

From the fact that the presence of traces does not count in the formation of an accent domain, a hypothesis is made:

(53) Hypothesis

Syntactic structure is invisible to accent domain formation

This hypothesis leads to the conclusion that any two rightmost Phrases form a single accent domain in connected speech. However, the hypothesis turns out to be false, when a Phrase occurring in a postverbal position is considered.

5.3.2. Postverbal Phrases

A Phrase may appear to the right of the T(ense) as an exceptional case, as I briefly mentioned earlier in the section. Any category of Phrases can be located in this position. There are two ways of interpreting how the Phrase occurs at the position in question: right-dislocated by movement, or inserted into that position for pragmatic reasons. The latter possibility is more likely, judging from several arguments put forward by Saito (1985)[9]. Saito's argument is based on 3 arguments: 1) the construction in question does not demonstrate the subject/object asymmetry observed with scrambling, 2) the construction is strictly a matrix phenomenon, i.e. it only appears in sentence-final position and not in clause-final position in general, and 3) overt resumptive pronouns are possible. This construction has quite different properties from those of scrambling, thus, the Phrase occurring in postverbal position is not regarded as having been 'moved by a scrambling operation'. As Fujii (1990) claims, the construction in question is adopted to help the hearer understand the discourse, relate the information to the hearer's knowledge network, and confirm the important points in the discourse.

Leaving aside the Syntactic status of a Phrase in postverbal position, I shall show how accent assignment is affected by those Phrases. Consider a sentence which can manifest itself in one of three surface forms, taking into consideration the fact that a Phrase can appear in postverbal position. The Phrases employed are a combination of accented and unaccented ones, to observe how accented/unaccented Phrases behave in post verbal position, and how they interact with accented and unaccented Verbs. (54) shows a sentence consisting of an accented Phrase, an

[9]As for the arguments against the right-dislocation analysis, Saito (1985) employs two arguments noted by Haraguchi (1973).

unaccented Phrase, and an accented Verb[10]. (54b) gives the form with an accentless Phrase occurring in post verbal position, and (54c) is the form in which the accented Phrase is in postverbal position. Group i) gives the citation form of the Phrases, while group ii) lists the possible connected speech forms.

```
        *                       *
(54)a.  takesi-ga     booru-o     nage-ru
       'Takesi-nom.' 'ball-acc.' 'throw- non-past'

          *                           *

       i) [ta ke si -ga]  [bo o ru -o]  [na ge ru]

           *                           *

      ii) [[ta ke si -ga] [[bo o ru -o]  [na ge ru]]]


    b.  takesi-ga       nageru       booru-o
       'Takesi-nom.' 'throw- non-past' 'ball-acc.'

          *                *

       i) [ta ke si -ga]  [na ge ru]  [bo o ru -o]

             *                (*)

      ii) 1. [[ta ke si -ga]  [na ge ru]]  [bo o ru -o]]

             *                *

          2. [ta ke si -ga]  [[na ge ru]  [bo o ru -o]]

               *                (*)

          3. [[[ta ke si -ga]  [na ge ru]]  [bo o ru -o]]
```

---

[10]As McCawley (1968) explains, from a form of a Verb it is not immediately evident whether that Verb is finally accented or accentess: however, it does become obvious if we attach an accentless noun, for example:

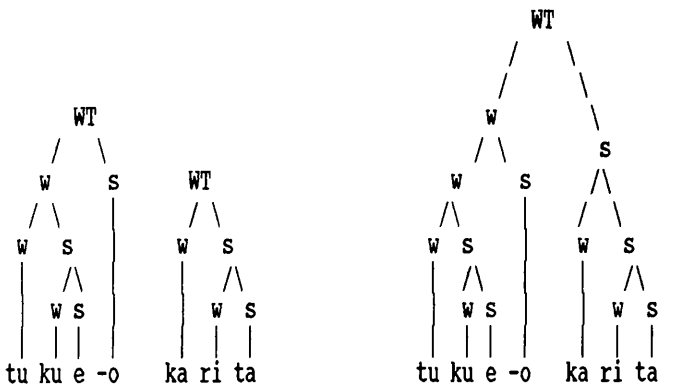
```
                                          *

        ka ri ta   u tu wa                na ge ru   bo o ru

     'borrow-past' 'bowl'              'throw-nonpast'  'ball'


     'a bowl which someone borrowed'        'a ball to throw'
```

c. booru-o nageru takesi-ga
'ball-acc.' 'throw- non-past' 'Takesi-nom.'

```
                    *       *
i) [bo o ru -o]  [na ge ru]  [ta ke si -ga]

                      *       *
ii) 1. [[bo o ru -o] [na ge ru]]  [ta ke si -ga]

                      *     (*)
   2. [bo o ru -o]  [[na ge ru] [ta ke si -ga]]

                      *     (*)
   3. [[[bo o ru -o] [na ge ru]]  [ta ke si -ga]]
```

As the three alternative forms of connected speech demonstrate, the Phrase in postverbal position interacts with other Phrases to form an accent domain. The way in which this differs from previous cases is that even though the postverbal Phrase is accented, the Phrase may join to form a single domain with the other two Phrases. Another interesting characteristic of postverbal Phrases is illuminated when the Verb is accentless. A sequence of two accentless Phrases has the head nucleus in domain final position.

(55)



...[tu ku e -o] [ka ri ta] --> ...[[tu ku e -o] [ka ri ta]]

'desk-acc.' 'borrow-past' '(I) borrowed a desk.'

Thus, if the postverbal unaccented Phrase interacts with the Verb to form an accent domain, the two Phrases are expected to behave exactly like the two Phrases in (55). However, in fact, the pitch patterns are intriguing, as we observe in (56), which has an accentless Verb. In (56b), an accentless Phrase occurs in postverbal position:

(56) a. takesi-ga tukue-o karita
'Takesi-nom.' 'desk-acc.' 'borrow-past'

i) [ta ke si -ga] [tu ku e -o] [ka ri ta]

ii) [[ta ke si -ga] [[tu ku e -o] [ka ri ta]]

b. takesi-ga karita tukue-o
'Takesi-nom.' 'borrow-past' 'desk-acc.'

i) [ta ke si -ga] [ka ri ta] [tu ku e -o]

ii) 1. [[ta ke si -ga] [ka ri ta]] [tu ku e -o]

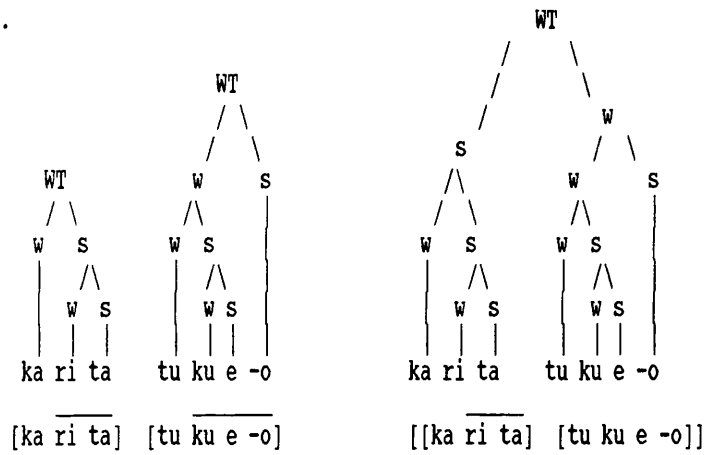
2. [ta ke si -ga] [[ka ri ta] [tu ku e -o]]

3. [[[ta ke si -ga] [ka ri ta]] [tu ku e -o]]

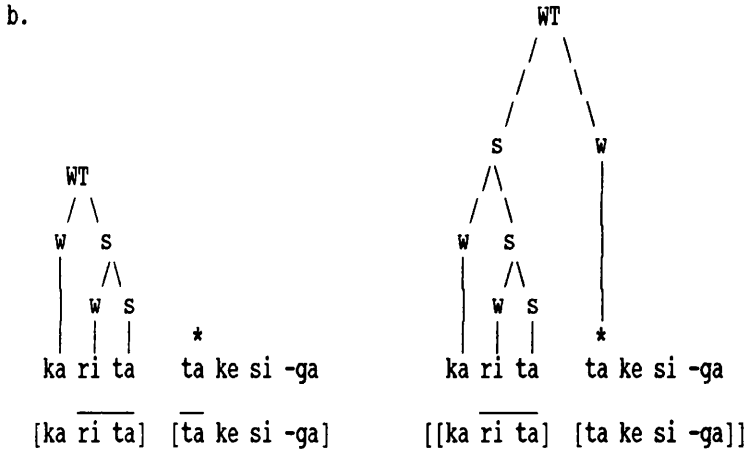
```
                                *
c. tukue-o      karita      takesi-ga
   'desk-acc.' 'borrow-past' 'Takesi-nom.'

                                *
 i) [tu ku e -o]  [ka ri ta]  [ta ke si -ga]

                                    *
ii) 1. [[tu ku e -o]  [ka ri ta]]  [ta ke si -ga]

                                  (*)
    2. [tu ku e -o]  [[ka ri ta] [ta ke si -ga]]]

                                  (*)
    3. [[[tu ku e -o]  [ka ri ta]]  [ta ke si -ga]]
```

What is interesting is that, whether or not the postverbal Phrase is accented, the domain has no high pitch. In other words, the metrical (accent) domain of the postverbal Phrase can never be the strong member of the higher tree. To illustrate, I represent the metrical pattern of (56bii2) and (56cii2) (only the Verb and the postverbal Phrase are represented):

(57) a.

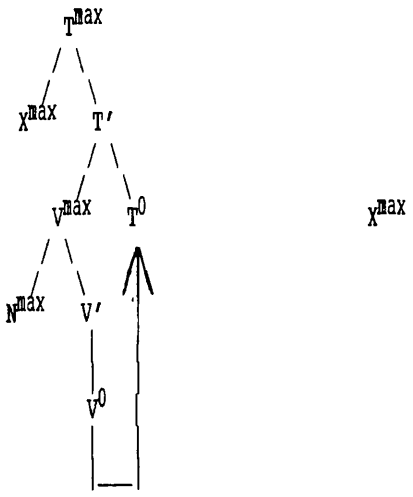


b.



Even though the postverbal Phrase contains a lexical marking, and the Verb which precedes the Phrase in question is accentless, the lexically marked nucleus cannot be the head nucleus of the concatenated domain. This means that the postverbal Phrase cannot be a strong member of the metrical tree. Recall that the head of the sentence is Tense, and that the head governs the Phrases to the left (left-branching) in Japanese (Fukui (1993). In other words, the postverbal Phrase, being outside the TP (Tense Phrase), cannot be the licenser of Phrases within the TP:

(58)



TP Postverbal Phrase

The lexically marked nucleus within the Phrase cannot be a licenser. This contrasts with the Verb-Noun sequence within the TP, where the Verb acts as an adjectival Phrase to modify the following noun.

It is interesting that the merger of accent harmony domains always involves tensed V; on the other hand, the trace which is left by a Phrase moved by the substitution operation is invisible to accent domain formation.

To conclude, Phrasal interaction of accent assignment does make reference to the syntax in that the head of a sentence, T, is involved in the merger of pitch accent domains. At the same time, the t (trace) of scrambled Phrases is transparent with respect to accent assignment processes involving the Verb and its adjacent Phrase at surface structure, which merge and form a single pitch accent domain.

CONCLUSION

In this thesis, I have demonstrated that the formalism of pitch accent in Standard Japanese is identical to that of stress in, for example, English. My claim also implies that not only Standard Japanese, but also other pitch accent languages such as Serbo Croat and Basque should conform to this analysis.

Following the framework of government phonology, which strives towards the goal of a universal phonology (see Chapter 1 for an outline of the theory), I have shown that a universal principle, the Licensing Principle (Kaye 1990a); along with the principles and parameters I propose in Chapter 3, can account for pitch accent phenomena, which must otherwise be treated with reference to an arbitrary language-specific phonological process (see Chapter 2 for the outline of previous analyses).

Chapter 3 discusses how accent is assigned to a morphologically simplex noun, inclusive of lexical accent assignment, which proves that the formalism of pitch accent assignment is identical to that of stress assignment.

Morphological interaction is another important aspect of pitch accent assignment, as indeed it is in stress assignment (Chapter 4). I explained how accent is assigned in compound nouns, and in a sequence of noun and case marking particle. Also, accent assignment in Verb morphology is found to be predictable, through the application of the same principles and parameters proposed in Chapter 3.

This thesis includes a detailed study of interaction between syntax and phonology in terms of pitch accent assignment. Pitch accent in a sentence is predictable by the recursive application of the same phonological process. In addition to that, a unique approach to the association between accent assignment and sentence structure is introduced, and I propose that pitch accent assignment respects the structure of a sentence, based on the pitch pattern of a postverbal phrase.

REFERENCES

Abe, Yasuaki (1981). Tone harmony schema: a theory of pitch accent. In W.Chao & D.Wheeler (eds.) Occasional Papers in Linguistics 7,1-26. University of Massachusetts.

Abe, Yasuyuki (1987). Metrical structure and compounds in Japanese. In T.Imai & M. Saito (eds.) Issues in Japanese Linguistics. Dordrecht: Foris.

Akinaga, Kazue (1985). Kyootsuugo no akusento [The accentuation of Standard Japanese]. In NHK, Nihongo Hatsuon akusento Jiten [Dictionary of Pronunciation and accent of Japanese]. Fourth edition 70-116, NHK: Tokyo.

Aoki, Paul (1981). Gemination in Japanese. PhD dissertation. University of Washington.

Aronoff, Mark (1976). Word-formation in Generative Grammar. Linguistic Inquiry Monograph series, no.1. Cambridge, Mass.: MIT Press.

Benette, Diana M. (1981). Pitch Accent in Japanase: Metrical Analysis. MA dissertation, University of Texas, Austin, Texas.

Bromberger, Sylvain & Morris Halle (1989). Why phonology is different. Linguistic Inquiry 20, 51-70.

Charette, Monik (1988). Some Constraints on Governing Relations in Phonology. PhD dissertation, McGill University.

Charette, Monik (1989). The minimality condition in phonology. The Journal of Linguistics 25, 159-187.

Charette, Monik (1990a). The effect of floating consonants on final nuclei. Paper presented at the 1990 GLOW meeting, London.

Charette, Monik (1990b). License to govern. Phonology 7, 233-253.

Charette, Monik (1991). Conditions on Phonological Government. Cambridge: Cambridge University Press.

Charette, Monik (1992). Mongolian and Polish meet Government Licensing. In SOAS Working Papers in Linguistics and Phonetics 2

Chew, John J. (1964). Accent in Japanese Compounds, in J. Yamagiwa (ed.) Papers of the CIC Far Eastern Language Institute 1963, Ann Arbor: Committee on Institutional Cooperation, 85-87.

Chomsky, Noam (1986). Barriers. Massachusetts: MIT Press.

Clark, Mary M. (1983). Japanese as a Tone Language. In T.Imai & M. Saito (eds.) Issues in Japanese Linguistics. Dordrecht: Foris.

Fabb, Nigel (1990). The difference between English restrictive and nonrestrictive relative clauses. Journal of Linguistics 26, 57-78.

Fujii, Yoko (1991). Nihongobun ni okeru gojun no gyakuten - danwagoyouronteki shiten kara no bunseki [Reversed word order in Japanese - A discourse-pragmatic analysis]. In Gengo Kenkyu 99, 58-81.

Fukui, Naoki (1986). A Theory of Category Projection and its Applications. PhD dissertation, Massachusetts Institute of Technology.

Fukui, Naoki (1993). A note on improper government. Linguistic Review 10, 111-126.

Fukui, Naoki (forthcoming). Comparative syntax of English and Japanese: the principles-and-parameters approach to typology. In Bynon Theodora & Shibatani Masayoshi (eds.) Approaches to Language Typology. Oxford University Press.

Fromkin, Victoria (ed.)(1978). Tone: a Linguistic Survey. New York: Academic Press.

Gimson, A. Charles (1980). An Introduction to the Pronunciation of English. London: Edward Arnold.

Goldsmith, John A. (1990). Autosegmental and Metrical Phonology. Oxford: Blackwell.

Guerssel, Muhammad & Jean Lowenstamm (1988). Classical Arabic 'metathesis'. Paper presented at Generative Phonology Workshop. University of Leiden.

Hale, Ken (1980). Remarks on Japanese phrase structure: comments on the papers on Japanese syntax. In Y. Otsu and A. Farmer (eds.).

Halle, Morris (1982). Metrical Trees and Metrical Grids. Paper presented at the GLOW Colloquium, Paris.

Halle, Morris & Jean-Roger Vergnaud (1982). On the framework of autosegmental phonology. In H.van der Hulst & N.Smith (eds.) The Structure of Phonological Representations 1, 65-82. Dordrecht: Foris.

Halle, Morris & Jean-Roger Vergnaud (1987). An essay on Stress. Cambridge MA: MIT Press.

Haraguchi, Shosuke (1973). Remarks on dislocation in Japanese. ms. MIT.

Haraguchi, Shosuke (1977). The Tone Pattern of Japanese: An Autosegmental Theory of Tonology. Tokyo: Kaitakusha.

Haraguchi. Shosuke (1983). Some tonal and segmental effects of vowel height in Japanese. In M. Aronoff & R.T. Oehle (eds.) Language Sound Structure. MIT Press.

Haraguchi, Shosuke (1987). The multi-dimentional grammatical theory. In T. Imai & M. Saito (eds.) Issues in Japanese Linguistics. Dordorecht: Foris.

Haraguchi, Shosuke (1988). Pitch Accent and Intonation in Japanese. In Harry van der Hulst and Norval smith (eds.) Autosegmental Studies on Pitch Accent, 123-150. Dordrecht: Foris.

Haraguchi. Shosuke (1991). A Theory of Stress and Accent. Dordrecht: Foris.

Harris, John (1990). Segmental complexity and phonological government. Phonology 7, 255-300.

Harris, John & Jonathan Kaye (1990). A tale of two cities: London glottalling and New York City tapping. In SOAS Working Papers in Linguistics and Phonetics 1, University of London, 3-20.

Hattori, Shiro (1930). "N" ni tsuite [Remarks on "N"]. Onsei-no kenkyuu 3, 41-47.

Hayes, Bruce (1980). A Metrical Theory of Stress Rules. PhD dissertation, MIT; circulated by the Indiana University Linguistics club, 1981.

Hayes, Bruce (1989). Compensatory lengthening in Moraic Phonology. Linguistic Inquiry 20, 253-306.

Higurashi, Yoshiko (1983). The accent of extended word structures in Tokyo Standard Japanese. Tokyo: EDUCA Inc.

Hirayama, Teruo (1957). Nihongo oncho no kenkyu [A study of Japanese accent]. Tokyo: Meiji Shoin.

Hirayama, Teruo (1960). Zenkoku Akusento Ziten (All-Japan Accent Dictionary). Tokyo: Tokyodo.

Hoijer, Harry (1933). Tonkawa: An Indian language of Texas. Handbook of American Indian Languages 3. New York.

Hoijer, Harry (1946). Tonkawa. Linguistic Structures of Native America. New York: Viking Fund Publications in Anthropology.

Hualde, Jose Ignacio (1991). Basque Phonology. London: Routledge.

Hyman, Larry M. (1975). Phonology: Theory and analysis. New York: Holt.

Inkelas, Sharon & Zec Draga (1988). Serbo-Croatian Pitch Accent: The Interaction of Tones, stress and Intonation. In Language 64:2, 227-248.

Ishihara, Masahide (1991). The Lexical Prosodic Phonology of Japanese Verbs. PhD dissertation, The University of Arizona.

Ito, Junko (1986). Syllable theory in prosodic phonology. PhD dissertation. University of Massachusetts.

Ito, Junko & Mester, Armin R. (1986). The Phonology of Voicing in Japanese: Theoretical Consequences of Morphological accessibility, Linguistic Inquiry 17, 49-73.

Kaye, Jonathan (1982). Harmony processes in Vata. In H.van der Hulst & N.Smith (eds.) The Structure of Phonological Representations 2, 385-452. Dordrecht: Foris.

Kaye, Jonathan (1989). Phonology: A Cognitive View. Lawrence Erlbaum Associates, N.J.

Kaye, Jonathan (1990a). 'Coda' licensing. Phonology 7, 301-330.

Kaye, Jonathan (1990b). Government in Phonology: the case of Moroccan Arabic. The Linguistic Review 6, 131- 159.

Kaye, Jonathan (1992). On the interaction of theories of lexical phonology and theories of phonological phenomena. In Dressler, W.U., Luschutzy, H.C., Pfeiffer, O.E. and J.R. Rennison (eds.) Phonologica 1988, 141-155. Cambridge: Cambridge University Press.

Kaye, Jonathan (1992). Do you believe in Magic? The story of s+C sequences. In SOAS Working Papers in Linguistics and Phonetics 2, 293-313. University of London.

Kaye, Jonathan (1993). Derivations and Interfaces. In SOAS Working Papers in Linguistics and Phonetics 3, 90-126. University of London.

Kaye, Jonathan, Jean Lowenstamm & Jean-Roger Vergnaud (1985). The internal structure of phonological elements: a theory of charm and government. Phonology Yearbook 2, 305-328.

Kaye, Jonathan, Jean Lowenstamm & Jean-Roger Vergnaud (1987). Constituent structure and government in phonology. Paper presented at the GLOW colloquium, Venice.

Kaye, Jonathan, Jean Lowenstamm & Jean-Roger Vergnaud (1989). Rektion und Konstituentrektion in der Phonologie. Linguistische Berichte 114, 31-75.

Kaye, Jonathan, Jean Lowenstamm & Jean-Roger Vergnaud (1990). Constituent structure and government in phonology. Phonology 7, 193-231.

Kenstowicz, Michael J. & Kisseberth, Charles W. (1979). Generative Phonology: Description and Theory. New York: Academic Press.

Kiparsky, Paul (1982). From Cyclic Phonology to Lexical Phonology. In H.van der Hulst & N.Smith (eds.) The Structure of Phonological Representations 1, 131-175. Dordrecht: Foris.

Kubozono, Haruo (1987). Nihongo fukugoogo no imi-koozoo to inritu-koozoo [On the semantics and prosody of Japanese compounds]. In Academia 43, 25-62.

Kubozono, Haruo (1988). The Organization of Japanese Prosody. PhD dissertation, University of Edinburgh.

Kuno, Susumu (1973). Nihon Bunpoo Kenkyuu, Tokyo: Taishukan.

Kindaichi, Haruhiko (1967). Nihongo on'in no kenkyu [Studies in Japanese Phonology]. Tokyo: Tokyodo.

Kindaichi, Kyosuke (1938). Zoho Kokugo on'inron (Japanese Phonology - Revised version). Tokyo: Toko Shoin.

Ladefoged, Peter (1975). A Course in Phonetics, New York: Harcourt Brace.

Leben, William R. (1973). Suprasegmental Phonology. PhD dissertation, MIT. Published 1980. New York: Garland.

Liberman, Mark and Alan Prince (1977). On stress and linguistic rhythm. Linguistic Inquiry 8, 249-336.

Matsumori, Akiko (1989). Jiritsubunsetsu-riron ni yoru nihongo oncho no kijutsu [An autosegmental study of Japanese pitch-accent system]. In Gengo Kenkyu 95. 120-143. The Linguistic Society of Japan.

McCawley, James D. (1968). The Phonological Component of a Grammar of Japanese. Hague: Mouton.

McCawley, James D. (1977). Accent in Japanese. In Studies in Stress and Accent, (ed.) Larry M. Hyman. Department of Linguistics, University of Southern California at Los Angeles.

McCawley, James D. (1978). What is a Tone Language? In Tone: a Linguistic Survey, ed. by Victoria Fromkin. New York: Academic Press.

Mohanan, K.P. (1982). Lexical Phonology. PhD dissertation, MIT.

Nespor, M. and I.Vogel (1979). Clash Avoidance in Italian. Linguistic Inquiry 10, 467-482.

Nespor, M. and I.Vogel (1982). Prosidic domains of external sandhi rules. In H.van der Hulst & N.Smith (eds.) The Structure of Phonological Representations 1, 225-255. Dordrecht: Foris.

Nihon Hoosoo Kyookai (NHK) (1985). Nihongo Hatsuon Akusento Jiten [Dictionary of Pronunciation and accent of Japanese]. Fourth edition, NHK: Tokyo.

Okuda, Kunio (1971). Accentual Systems in the Japanese Dialects: A generative approach. Tokyo: Bunka Hyoron- sha.

Oono, Susumu & Hamanishi, Masando (1985). Ruigo Kokugo Jiten [Japanese Synonym Dictionary]. Tokyo: Kadokawa Shoten.

Pierrehumbert, Janet & Mary Beckman (1988). Japanese Tone Structure. Linguistic Inquiry Monograph 15.

Pollock, Jean-Yves (1989). Verb movement, universal grammar and the structure of IP. Linguistic Inquiry 20, 365-424.

Poser, William (1984). The Phonetics and Phonology of Tone and Intonation in Japanese. PhD dissertation, MIT.

Poser, William (1990). Evidence for foot structure in Japanese. Language 66, 78-105.

Pulleyblank, Douglas (1983). Tone in Lexical Phonology. PhD dissertation, MIT.

Pulleyblank, Douglas (1986). Tone in Lexical Phonology. Dordrecht: Reidel.

Saito, Mamoru (1985). Some asymmetries in Japanese and their theoretical implications. PhD dissertation, Massachusetts Institute of Technology.

Sakurai, Shigeharu (1985). Kyootsuugo no hatsuon de chuuisurubeki kotogara [Notes on the pronunciation of Standard Japanese]. In NHK, Nihongo Hatsuon akusento Jiten [Dictionary of Pronunciation and accent of Japanese], Fourth edition 70-116. Tokyo: NHK.

Sato, Hirokazu (1989). Fukugoogo-ni okeru akusento kisoku to rendaku kisoku [Accent rules and Sequencial voicing rules in compound words]. In Sugitoo, Miyoko (ed.) Nihongo-no Onsei On'in 1, Kouza Nihongo to Nihongo Kyooiku 2. Tokyo: Meiji Shoin.

Sato, Yasuhide (1989). Speech errors in Japanese. M.A. dissertation. SOAS, University of London.

Selkirk, Elisabeth O. (1980). The Phrase Phonology of English and French. New York & London: Garland Publishing, Inc.

Shibatani, Masayoshi (1971). The non-cyclic nature of Japanese accentuation. Language 48:3, 584-95.

Vance, Timothy J. (1987). An Introduction to Japanese Phonology. Albany: State University of New York Press.

Williams, Edwin (1981). On the Notions 'Lexically Related' and 'Head of a Word'. Linguistic Inquiry 12, 245-274.

Yoshida, Shohei (1990a). On'inron ni okeru toosotsu ni tsuite [On government in phonology]. In Gengo Kenkyuu 97, 95-123.

Yoshida, Shohei (1990b). A government-based analysis of the 'mora' in Japanese. Phonology 7, 331-335.

Yoshida, Shohei (1991). Some Aspects of Governing Relations in Japanese Phonology. PhD dissertation, SOAS, University of London.

Yoshida, Shohei (1993). Licensing of empty nuclei: The case of Palestinian vowel harmony. In Linguistic Review 10, 127-159.

Yoshida, Yuko (1989). Structure of a geminate in the Kyoto dialect of Japanese. MA dissertation. SOAS, University of London.

Yoshida, Yuko (1990). Government in Tonkawa: vowel elision and cyclicity. In SOAS Working Papers in Linguistics and Phonetics 1, 53-70. University of London.

Yoshida, Yuko (1991a). Interaction of morphology and lexical accentuation in tonal harmony of Standard Japanese. Paper presented at the Linguistics Association of Great Britain, University of York Meeting.

Yoshida, Yuko (1991b). Pitch accent and tone in Japanese. Paper presented at the workshop 'Japanese from a universal perspective: London School of Linguistics', Kyoto. Ms. SOAS, University of London.

Yoshida, Yuko (1992). Pitch accent and tone harmony in Japanese. In SOAS Working Papers in Linguistics and Phonetics 2, 339-361. University of London.

Zubizarreta, Maria L. (1982). The Formal Interaction of Harmony and Accent: The Tone Pattern of Japanese. In H.van der Hulst & N.Smith (eds.) The Structure of Phonological Representations 2. Dordrecht: Foris.